ECEMBER, 1942 Pre-Convention Number

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Industrial Arts and VOCATIONAL EDUCATION

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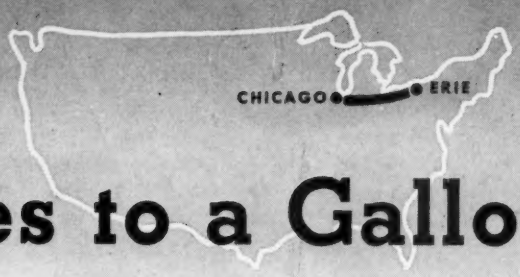
THE SHOP TEACHERS' PROFESSIONAL MAGAZINE



450 Miles to a Gallon of Gas

—and what do we get now?

IT would seem as if many of the problems confronting the human race are problems of misdirected, misspent and wasted energy. For example, it was stated just recently that if means were at hand to utilize all the energy in gasoline, a gallon of it would drive a car 450 miles. This amazing claim merely highlights and dramatizes the waste referred to.

But as every educator knows, nowhere is the waste more evident or more tragic than in the department of human activity. Even if there were important differences in human energy or human ability they could hardly account for the huge success that caps one man's efforts and the equally huge failure into which another man blunders. Obviously, success springs from something which happens in the lives of some men and not in the lives of others.

Leaf back through the life history of any man of achievement and you will find this "something," a point within the formative years of his youth where the spark of *desire* was struck and fanned into flame, where his *way* of thinking changed, where each task of the day was no longer a pointless drudgery of the moment but a new decisive step toward a definite goal in the future.

There is such an M-day within the early life of *every* successful man . . . the day when he mobilizes his abilities, his energies and his will around an ambition, when he begins to discriminate between the good and the false, when he respects real craftsmanship and is no longer satisfied with merely "good enough".

Intelligent educators today are keenly aware of their opportunity to play a vital part in bringing such happiness into the lives of men and such sound protection to civilization into a bewildered world. Leadership inspires leadership. Discrimination fosters discrimination. Drafting instruments, for instance, can be either mere tools for today's tasks or a turning point in the lives of men. They are instruments of creation. They can be a challenge to perfection, an inspiration to craftsmanship, an entire training in self-discipline, an unending lesson in the pride and performance which come only from discriminating choice. The slightly higher cost of instruments capable of such influence is a sensible investment in success.

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

VOL. 31 DECEMBER, 1942 Number 10

TOLEDO — THE CONVENTION CITY

C. T. Cotter, the director of vocational training for war-production workers at Toledo, Ohio, on page 411 of this issue, gives a fine description of what Toledo is offering its youth in the way of real training for life.

Those who attend the A.V.A. convention to be held at Toledo, Ohio, December 2, 3, 4, and 5, will have an opportunity to visit the schools described by Mr. Cotter, and see the fine work that is being done.

Attendance at the convention gives them an opportunity to see and speak to those who are leaders in industrial arts and vocational education and whose names rank high the country over wherever practical education is mentioned.

Besides this they will be able to meet old friends and become acquainted with other teachers whom they know by reputation or from their writings which have appeared in our professional magazines, or in educational books.

Above all, those who attend may well feel that they are assisting at deliberations which are very necessary in these troublesome times. They may feel assured that they will return home better able to cope with the serious problems that confront our educational efforts.

THIS MONTH'S COVER

The cover chosen for the December cover of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows one of the new tanks which will help our soldiers gain a final victory over our enemies.

THE ANNUAL INDEX

Your index for the 1942 volume of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has been bound into this issue. Consult it and make use of it.

HELP THE WAR EFFORT
BUY WAR BONDS

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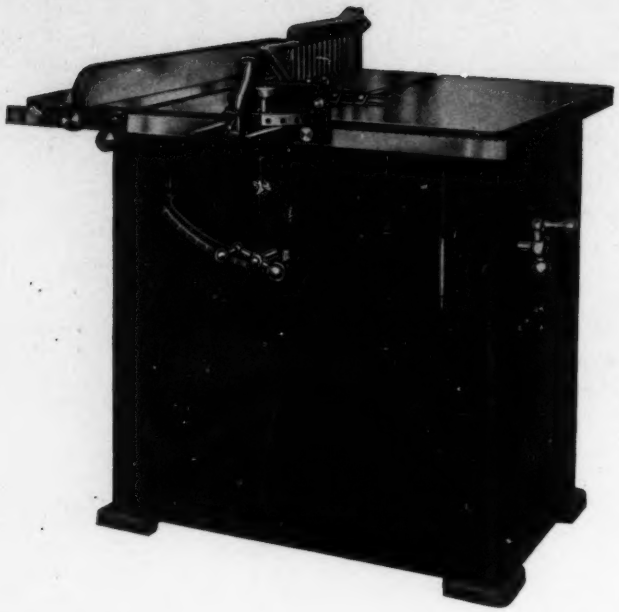


W-55
CIRCULAR SAW

VIGILANCE is the watchword of the day! Now more than ever it is necessary that school shop teachers be careful to obtain the highest efficiency and the most service from their equipment.

Well constructed as they are, Yates-American machines do, however, require some attention and consideration. The W-55 Circular Saw, for example, will last longer and do better work if a few simple precautions are observed.

Good Machines Deserve Good Care

(1) The drive on this saw employs three vee belts of rubber. Care should be taken to keep them properly tensioned at all times. Belts that are loose will slip on the sheave and burn.

(2) The saw blade deserves the same care you would give any other edged tool of high quality. Keep it sharpened. See that it is set properly. Protect it from abuse. Always use the proper type of blade for the work at hand. Changing saws is greatly facilitated by the pin-type arbor lock found on this machine.

(3) Avoid "crowding" or overloading the saw. Such practice puts harmful strain on the motor, bearings and other operating parts. If this is done continuously it may lead to costly repairs.

(4) Make full use of the safety devices furnished. They were designed to protect both the machine and the operator.

Do you have a copy of the instruction book for this saw? If not, write for one, there is no obligation.

YATES-AMERICAN MACHINE COMPANY • BELOIT, WISCONSIN

Short Talks on Wood

HOLLY (*Ilex opaca*)

The leaves and berries of this tree have long been employed as a Christmas decoration, a survival of the ancient practice of hanging evergreen inside as a refuge for the spirits of the forest during inclement weather.

The wood is moderately hard and heavy, tough and uniform in texture. It is easily worked and takes an excellent polish. Its creamy white color and absence of grain gives it the appearance of ivory.

Is much in demand as an inlay wood for cabinet work and is also used for woodturning, piano and organ keys and small novelties. The relentless ravaging of this tree for the Christmas trade has made it much less plentiful than in former years.

Found in greatest abundance along the Atlantic coast from Florida to Massachusetts, also along the Gulf coast and northward up the Mississippi to Indiana. It thrives best in deep, moist fertile soil.

A small tree, seldom exceeding 30 feet in height and 12 inches in diameter. Has a dense, narrow pyramidal head. An attractive ornamental.

The bark is smooth, light gray and roughened by warty growths. The leaves are simple, alternate, oval, thick and leathery. They are 2 to 4 inches long, dark green, glossy and armed with spiny teeth. Male and female flowers are borne on separate trees. The female trees bear bright red berries about the size of a pea. Both leaves and berries stay on the branches over winter.

To date, forty brief articles similar to the one above and dealing with the more commonly used woods have appeared in these ads. As in the past, we continue to invite your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

Toledo Is Host to the 1942 A.V.A. Convention

C. T. COTTER*

The city of Toledo is situated in northwestern Ohio on the historic Maumee River, and at the extreme west end of Lake Erie.

It is a city of varied industries, with glass, and automotive subsidiaries predominating. It is the home of the celebrated Libbey Cut Glass, Libbey Owens Ford Glass Company, and the Owens Illinois Glass Company. In the automotive field, Toledo produces such items as transmissions, spark plugs, die castings, paint and lacquers, upholstery, completed cars, and the like. Manufacturers, such as Champion Spark Plug, Electric Auto Lite, DeVilbiss Manufacturing Company, Willys Overland, and Doehler Die are nationally known.

Very recently the American Propeller Corporation and the Lycoming Liquid Cooled Engine Division have been added to our war-production industries.

Toledo is also an important grain and flour center, and in the surrounding area are many nationally known hothouse gardeners operating on a large scale producing vegetables such as tomatoes, lettuce, cucumbers, and radishes. In this area also are to be found large dairy farms with herds of thoroughbred cattle and condenseries for processing and canning milk products.

Situated as it is, Toledo is an important railroad center and transportation terminal. It is the gateway for coal going north from the mines in the south, and for grain and iron ore from the northwest going to the south.

From an educational and cultural point of view, Toledo has an outstanding and progressive system of public schools, both as to curriculums and buildings. It has a new two-million-dollar public library, an art museum which has received naional recognition, and a municipal university of unusual merit and standing.

The public schools have been pioneers in the fields of trade and industrial home economics, industrial arts, art, and commercial education. Instruction in the arts and trades was given its first impetus in the year 1872 by a gift from one of its farsighted and progressive citizens, Jessup W. Scott, for the purpose of establishing such a school. The year 1885 saw the completion of a building which bore the name, "The Scott School of Arts and Trades." In cooperation with the public high schools it provided practical training to high school students, the building having been built adjacent to, and connected with, the Central High School. (Recently this historic building has been torn down to make way for the new public library.)

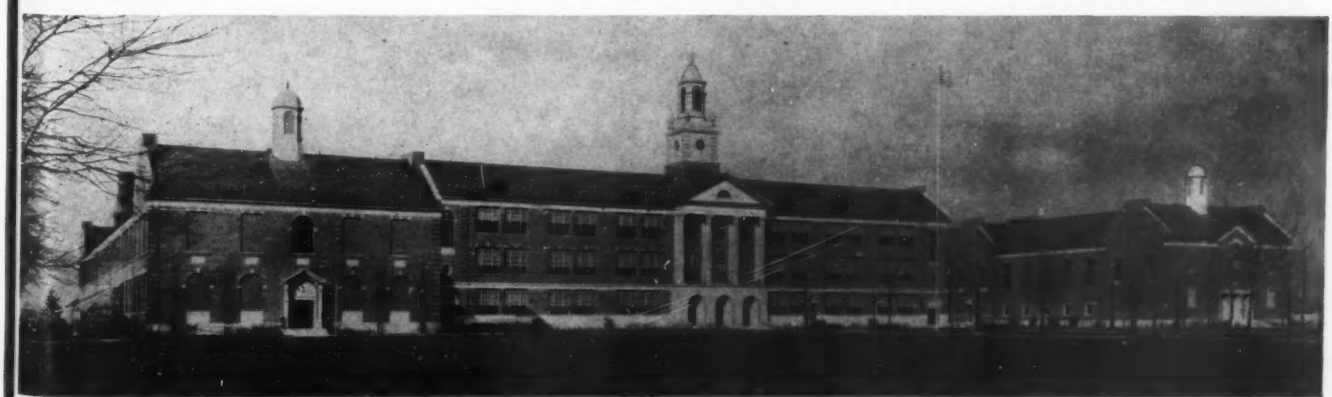
This beginning in the late 70's and early 80's provided the inspiration and foundation for the new University of Toledo, and was the motivating factor in the progressive development of industrial Arts, home economics, art and trade, and vocational curriculums in the Toledo schools.

Those who visit Toledo will find five senior high schools, three junior high schools, and thirty-four elementary schools, all equipped to offer courses in the practical arts on their various levels. There also are two vocational high schools, one for boys and one for girls.

Vocational Education

In the field of vocational education, conducted and reimbursed under the Ohio plan for vocational education, we have the

*Cochairman of the local A.V.A. Executive Committee. Director of Vocational Training for War-Production Workers, on leave for the duration from The Directorship of Vocational and Industrial-Arts Education, Toledo Public Schools, Toledo, Ohio.



DeVilbiss High School, Toledo, Ohio

Molding

Patternmaking

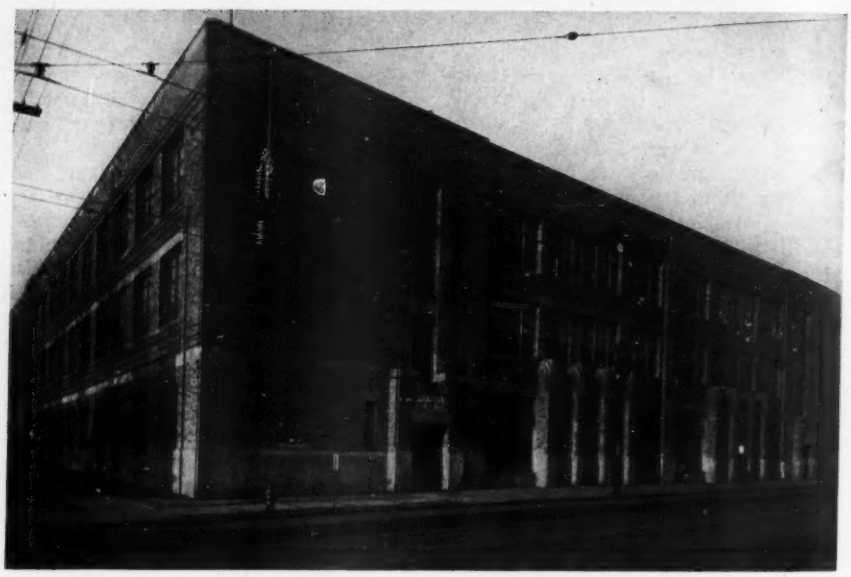
Harriet Whitney High School for girls and Irving E. Macomber Vocational High School for boys.

These schools have been built and occupied within the past four years. They are located in the downtown section on adjacent sites, and function under separate principals. Both buildings were financed under the Public Works Administration, and represent a total investment of over two and one half million dollars.

The trades to be offered in these schools were determined from local occupational surveys made previous to the erection of the buildings and the building facilities apportioned accordingly.

The completion of the ninth grade in junior or senior high schools is required for entrance, so they are essentially three-year vocational high schools.

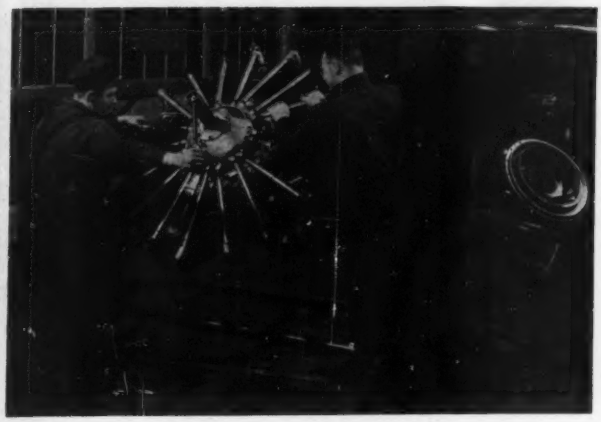
The Macomber Vocational High School for boys provides facilities for shop and related training for 16 different trades. It accommodates 1200 students and besides



Macomber Vocational High School, Toledo, Ohio

Lt. Col. John C. Mechem and First Lt. Harry E. Caldwell, Jr., inspecting Toledo's training program. Mr. Sam Snell is the instructor

War-production trainees working on the power lathes in the Woodward machine shop, at Toledo, Ohio



Airplane motor assembly

Welding shop at the Macomber Vocational High School

the shops, related classrooms, and laboratories, has an auditorium (1000 capacity), gymnasium and bleacher gallery, cafeteria, library, hospital and first-aid unit, receiving and storeroom and an administrative unit. In addition to the regular trade program, classes in apprenticeship, evening school, and the training of war-production workers are carried on in this building.

The Harriet Whitney Vocational High School for girls provides facilities for shop and related training in foods, clothing, cosmetology, commercial and retail selling occupations. It accommodates 800 students. In addition to shop and classrooms, there is a cafeteria, library, hospital unit, gymnasium, retail store, and tearoom. Courses in distributive education and evening classes, and classes for war-production workers also are conducted in this building.

Harriet Whitney Vocational High School for Girls, Toledo, Ohio

Industrial Arts, Home Economics and Art

The senior high schools, while built at different times during the past 28 years, house essentially the same types of courses in home economics, art, and industrial arts. Courses in foods, clothing, arts, and industrial arts in the fields of mechanical drafting, electricity and radio, auto and aero mechanics, wood and cabinetmaking, machine and formed metal, etc., are included in each building.

Two junior high schools — Jones and Robinson — were designed for this particular type of program and include grades 7, 8, and 9. These buildings are, therefore, provided with the necessary shops and laboratories for foods, clothing, art, and industrial-arts classes, physical education, cafeteria, auditorium, library, etc.

Thirty-four elementary schools are equipped with general industrial-arts shops, food and clothing laboratories for classwork on the seventh- and eighth-grade level.

Space does not permit a description of the many courses in these various fields and on the different levels that have been indicated, and for that reason the details have been omitted.

War-Production Training

Our nation is at war and Toledo is doing its part in the training of war-production workers by making full use of the school shops, equipment, and facilities. This training has been going on for the past two years, and so far local training demands

Tool and die designing

Auto motor check-up

have been met without any interference with the regular school program.

It was fortunate in this emergency that the public high schools had the shops and the equipment and trained teachers to assist in doing this job.

As Toledo is a city of varied industries, its contribution to the war effort naturally has followed a varied pattern, and the training program has centered around the metal trades with emphasis on the training of machine operators, sheet-metal workers, patternmakers, welders, and auto and aero mechanics, foundry inspectors, machine and tool designers, etc. In this respect perhaps, Toledo is no different than hundreds of other industrial cities for we are carrying out the policies as established by the U. S. Office of Education.

A.V.A. Convention

Toledo welcomes the American Vocational Association in a war year. It is indeed unfortunate that it had to be so. We are fully aware of the restrictions and limitations which wartime imposes on such a gathering, and accept our responsibilities as hosts to this convention, in a spirit of cooperation and service.

Vocational education is playing a very important part in the war-production effort. We must, therefore, carry on deliberations and formulate recommendations and policies through meetings such as this. On this convention rests the responsibility of analyzing whatever new problems industry presents in this current production period and which are to come, during the adjustment period after the war.

Planning the Daily Lesson*

WILLIAM J. MICHEELS**

The daily lesson is the means whereby the objectives of any course are attained. It is the firing line for the instructor; his mission is either realized or not through the daily lessons. Being of such importance it is essential that there be careful and adequate planning. A common characteristic of poor teaching is that shown by the instructor who attempts to teach without a definite plan. He often "stalls out" the latter part of the period for want of something to do; his questions lack direction; he leaves gaps in the instruction; his tools and equipment are not ready when needed; in fact, he is apt to commit numerous blunders that could easily be prevented by proper planning. The instructor who maintains he has taught the course so many times that a lesson plan is not necessary is fooling no one but himself, for classes and conditions will differ and the necessary adaptations cannot be *thought out* effectively while standing before a class.

Planning is as essential in teaching as in constructing a bridge. The instructor must know what he is going to do, how he is going to do it, and when he is going to do it — he must have, in effect, a blueprint. This does not necessarily mean that complicated, confusing forms must be filled out in boring detail. Rather, the plan must be of such nature that it will be of the greatest assistance to the instructor in his teaching. In this sense the lesson plan may be defined as an organized outline that will guide the instructor in the presentation of a lesson. The form of the plan should be such that it will best meet the needs and requirements of the department or division in which instruction is being given. It must be flexible. There cannot be an absolute standard to fit all situations because teaching content and teaching methods vary in such manner as to call for different approaches.

Lesson plans are helpful in several ways. They are used (1) to insure uniformity of presentation as the same lesson is taught at different times and by different individuals, (2) to guide the study of the instructor as he prepares the lesson, (3) to assist the instructor in arranging any physical *setup* that might be necessary, and (4) to guide the instructor as the actual lesson is presented. The individual who argues that it takes too long to write out complete lesson plans does not realize that efficiency of instruction is dependent upon good planning. He also fails to understand that the time spent in original planning is time saved as the lesson is taught at a later date. From this point of view the written lesson plan is a means of saving time rather than wasting it.

The following outline for a lesson plan should be thought of as being flexible. The order should be changed whenever practical. In certain instances there may be no headings at all. The instructor may merely list, in order, the procedure to be followed in teaching a given lesson. *However,* all of the points mentioned in the following list should be included whether or not they are labeled. In certain instances it may be desirable to make the assignment at the beginning of the period rather than at the end; it may be helpful to summarize several times during the lesson; questions may be included in a separate section, or as a part of other sections, and other similar adaptations may be necessary. The lesson plan should be constructed in such a manner that these variations can be taken care of when necessary.

Included within a well-conceived lesson plan will be the following information:

1. The tools and equipment needed.
2. The visual aids to be used.
3. The references that pertain to the lesson.
4. A review of essential points from previous lessons.
5. The objectives of the lesson.
6. A step-by-step outline of the material to be presented or procedures to be followed.
7. A step-by-step outline of any demonstrations (may be included as a part of the above).
8. Leading and discussion questions.
9. A summary of important points.
10. The assignment for the next lesson.
11. A time schedule (when needed).

As already stated, this *order* is not to be considered one that must be followed exactly at all times, although the essential information would be included. The following paragraphs contain, in more detail, an explanation of the type of material that should be included under each of these headings.

Tools and Equipment to Be Used

In most lesson plans the tools and equipment to be used are listed at the top of the sheet. Under this heading will be included all such material that is necessary for the teaching of a lesson. It is an important section and makes for efficiency of instruction. The instructor who must go to the toolroom in the middle of a demonstration and look around for a tool or piece of equipment is not only wasting time but is likely to find that his class has lost interest. This means that additional time will have to be spent in getting the students up to the right point. If this happens many times the students lose confidence in the ability of the instructor.

Some instructors make careful mental preparation before they collect their tools and equipment. This again wastes more time than is necessary. By having a written list of necessary materials for a given

*This is the third of a series of articles on presentation of lessons from staff members of the Teacher Training Department (Lt. Col. Verne C. Fryklund, Director), of the Armored Force School (Brig. Gen. S. G. Henry, Commandant), Fort Knox, Ky. Trade Analysis and Human Relations were taught in the school prior to teaching the content of these articles. The articles will not appear in sequence. Certain details referring to the military have been deleted.

**Assistant Director, Teacher Training Department, Armored Force School, Fort Knox, Ky.

lesson, time will be saved each time the lesson is taught. As this list is devised, the best procedure is to go through the lesson completely in order to ascertain everything that will be necessary. The method of listing the tools and equipment should follow the form accepted as standard by the various departments.

Visual Aids

The significance and use of good visual aids will be discussed thoroughly in a later lesson. It is important to state here that their use should be indicated in the lesson plan. As with tools and equipment, the list of visual aids is usually placed at the top of the sheet. This helps to insure that the correct visual aids will be used each time the lesson is taught. Whenever new aids are available they can be added to the list.

As the instructional steps are listed within the body of the lesson plan, the use of specific visual aids should be indicated. It is important that their use be well planned and timed in order to make for the most effective type of presentation. If simple blackboard illustrations are to be used they should be sketched in the lesson plan or on a separate sheet. The experienced instructor well knows how easy it is to forget important details when he tries to remember illustrations while actually teaching. A simple sketch in the lesson plan will help to prevent such embarrassing situations.

Review of Previous Lessons

It is important to make adequate provision for review points that are to be included in a given lesson. Repetition is necessary in effective learning. A major purpose of review is to *clinch* the major items that have been taught in previous lessons. It may be formal or incidental. That is, a definite period of class time may be set aside for going back over previous work, or the review points may be brought in from time to time as the lesson progresses. The procedure used may vary from lesson to lesson, but whatever the approach, the instructor must plan accordingly.

Review points should be included within the lesson plan whenever practical. They should not be long and involved. The important points to be covered should be itemized to make sure that time is not wasted. The question approach might well be used. By asking well-prepared questions the review is accomplished by the students and the role of the instructor becomes that of directing the discussion.

In planning a lesson the review will often serve as an effective means of tying together the work of previous lessons with the material about to be taught. This is important, for a common learning difficulty is that experienced by the student who does not understand the relationships existing between the daily lessons. Important points should be stressed again and again. The best method of attaining such emphasis is to provide for it in the lesson plan.

Objective of the Lesson

A necessary part of every well-developed lesson plan is a statement of the objective of the lesson. It is an expression of what is to be attained as a result of teaching the lesson and should be written in the terms that will be used in the presentation. This may necessitate the inclusion of a few phrases that will suggest the importance of the objective and why the material is being taught.

As has been explained previously, the title of the lesson will often indicate the objective. It should be re-emphasized that the objective must be made known to the students and everything taught during a given lesson must be justified on the basis of how it helps to attain the objective. The instructor should continue to ask himself, "How does this material or that procedure help in attaining the objective I have in mind?"

Instructional Steps or Outline

The body of the lesson plan will be made up of the instructional steps to be taught or an outline of the material to be covered. This is the most important part of the plan for it contains a step-by-step résumé of what is to be done as the instruction proceeds. It is an outline of the exact procedure to be followed. This part of the plan can be taken directly from the analysis, although certain additions or adaptations will be necessary. The instructional steps of the analysis will usually be written in telegraphic form and contain only the main points of the instructional unit. The lesson plan will be more complete, especially when it is to be used by the beginning instructor. However, when the analysis contains a fine breakdown of each unit of instruction it is possible to use this material verbatim, together with additional aids that may be necessary.

The instructional steps should be phrased in such a way as will make for ease of reading. The writing must be legible and the statements constructed in such a manner that a glance will remind the instructor of what is to come next. The statements must not be long, for there will then be awkward gaps as the instructor studies his notes. Neither can the wording be too brief for the meaning will be confused and it may be difficult to interpret what had been intended. Beyond these two extremes it becomes somewhat of an individual problem. Instructors will tend to develop individual preferences as to how they like notes prepared. When a single lesson plan is being made for a group of instructors it is better, naturally, to err in the direction of having the statements too complete rather than too brief. It must be remembered that the instructional steps are listed to serve as a guide and a help to the individual instructor. When they fail to do this, revisions should be made.

The instructional steps should be thought out and planned in such fashion that they contain *punch* rather than a mere listing of the facts to be presented. The students must understand that what they are learning is definitely related to what they will be doing when they are back with their organizations. Examples and illustrations of application must be included in the plan, for few instructors are adept at providing these extemporaneously while presenting the lesson. When examples and illustrations are thought out ahead of time and included in the lesson plan, the effectiveness of the presentation is greatly improved.

As the instructional steps are listed, care must be exercised to make sure that all parts of the lesson are *tied* together. There must not be awkward gaps in the transition from one point to another. This often happens when the instructor uses only a brief topical outline that contains no mention of how the parts are tied together. Even experienced instructors find that insufficient notes make for inefficient teaching.

Demonstrations

There are several ways in which the demonstration may be included in a lesson plan. In most cases it will depend on the type of lesson being presented. If the demonstration is short and merely an explanation of a theory or principle presented in the regular lesson, it may be made a part of the instructional steps explained in the foregoing. If the demonstration is long, though definitely a part of the lesson, it may be outlined on a separate sheet with a note in the instructional steps to give the demonstration at a certain time. In certain lessons where the demonstration is all that is to be presented, the regular plan can be used, the instructional steps giving the procedure to follow as the demonstrating takes place.

Whatever the form, there should be an outline of the step-by-step procedure. Included will be the questions to be asked, the visual aids to be used and a specific summary of the operating steps or principles presented.

Leading Questions and Discussion Questions

Specific questions should be included as a part of the instructional steps wherever they will aid in the presentation of the lesson. They may be used at the beginning, in the middle or at the end of the lesson, depending upon the subject matter and the method being used to teach it. Every major part of the lesson plan may include questions. In addition, there may be a separate section of questions to be used for purposes of discussion. It is true that the instructor cannot prepare ahead of time all the questions that may be used in a given lesson. But, he can plan for specific, leading questions that stimulate thought and call for application; and this is a most important aspect of teaching. Naturally, it

is better to have a few well-constructed, thought-provoking questions than a great many that are of small importance and do little more than waste time. The time spent in phrasing *good* questions will be repaid many times over as the work of the course proceeds.

Class discussion may or may not be made a formal part of the lesson plan. If a definite period of class time is to be spent in discussion, then it is logical to expect that adequate preparation will be made. The questions just discussed will be included in such a section. To re-emphasize, questions should be well worded, and of such nature that they stimulate and provoke careful thought. They should be used by the instructor to direct the discussion and in such manner as will enable him to reach the desired goal.

Summary of Important Points

An important, but often neglected part of every lesson is the summary. It is used to tie together the important points that have been taught. For this reason it should be well planned. The summary will usually come at the end of the lesson, but the instructor may also summarize along the way and then bring together at the end the important points that have been brought out.

Within the lesson plan there should be more than mere mention that a summary is to be given. *Definite, specific points should be listed.* There should be no question of how the summarization is to proceed. It should not be long, nor involved; the purpose is to present as simply as possible the important things that have been taught.

In many respects the summary will be similar to a review. As a lesson is reviewed on succeeding days, the review outline can be copied almost verbatim from the preceding summary. When the work of the entire course is reviewed, the summaries for the daily lessons can be used to good advantage. The instructor must remember that the summary is not a device to be used only when he has some time to spend. *The summary should be a vital and purposeful part of every lesson.*

Timing

Where speed in training is essential and where there is a minimum of instructional time, it becomes necessary to assign arbitrary time limits for each part of the lesson. Some instructors do this by writing the time allocated to each part on the side of the lesson plan. Another method is to estimate the running time for each part and note this on the lesson plan. For example, at 10:15 a certain point should have been reached, at 10:25 another point should have been covered, and so on. Such a procedure is a guard against covering only a part of the lesson. Time limits are relative, however, and used as guides rather than strict limitations that must always be met.

Lesson Planning for Practical Work Only

In certain instances instructors will be teaching classes in which no formal instruction is given. Such teachers often say that lesson plans are unnecessary because they only answer questions and help the students in their work. However, even this type of instruction must be preceded by planning if the most effective type of learning is to take place. The lesson plan will not necessarily follow the outline described in the foregoing, but it will indicate what is to be done during a particular period. The instructor who just sits around and waits for the students to come to him is making learning passive rather than active.

By *thinking* through the day's work carefully and ahead of time, and by writing down what is to be done, the teaching can be made much more effective. Included within this type of written plan may be such details as a series of questions to be asked, points to be noted while observing students at work, problems to be presented, or work assignments to be made. Careful planning for the instruction that is to be given during periods of practical work invariably results in the improvement of instruction.

Assignment for the Next Lesson

Assignments should be purposeful and motivating. Instead they are often impotent, uninspiring statements such as, "For tomorrow read chapter 3 and answer the questions at the end." This type of approach tends to make the student become disinterested rather than eager to apply himself. The experienced instructor, upon thinking back, will realize that he often has made a similar assignment. It is a common fault that can be corrected easily by a few minutes thought. The assignment should be a part of the lesson plan and should be presented when most appropriate. In certain instances it will best come at the start of the lesson; in other cases it might fit better at the end.

The well-planned assignment need not be long, but it should be phrased to motivate the student. It should tell the student: (*a*) What he is to do; (*b*) why he is to do it; (*c*) how he is to do it (directions); and (*d*) any hints or suggestions that will aid in accomplishing the desired results.

Sample of Lesson Plan

A typical lesson plan is included to illustrate certain of the points discussed above. It has been taken from the Communication Department, Armored Force School. Space does not permit the inclusion of additional samples from the several other departments. They would serve to accent the point that all lesson plans for all departments need not follow a strictly stereotyped and standardized form. They would further emphasize the importance of having flexible plans that best meet the needs and requirements of individual departments.

Division: *Radio Operator Instructor Class*
Lesson No. 5 *Electricity and Magnetism*
Lesson Plan — Ohm's Law

Equipment and Materials:
See Demonstration Sheet No. 4.

Visual Aids:
1. E & M Charts, 9 and 10.
2. Definition and formulas written on board and covered up.

References:
1. *Electricity and Magnetism*, AFS Text, Chapter 4.

Procedure:
1. *Review*
   a) What is current? How is it measured?
   b) What is meant by voltage? How is it measured?
   c) What is meant by resistance? How is it measured?
   d) Is there any relationship between current, voltage, resistance? When something happens to one will something happen to the others?
2. *Objective* — This lesson is to teach the relationship between these three. Expressed by Ohm's Law. After today you should be able to apply this law by means of a simple formula.
3. *Instructional Steps*
   a) Definition of Ohm's Law (on blackboard) — the relationship that exists between current, voltage, resistance.
   b) With resistance constant the current which will flow in a given circuit is *directly* proportional to the applied voltage.
      (1) Show by simple figures.
      (2) $16 = \frac{32}{2}$; $32 = \frac{64}{2}$; $64 = \frac{128}{2}$
   c) With fixed voltage the current will vary *inversely* with the amount of resistance placed in the circuit.
      (1) Explain by using the foregoing figures.
      (2) $16 = \frac{32}{2}$; $8 = \frac{32}{4}$; $4 = \frac{32}{8}$, etc.
   d) Ohm's law is expressed in exactly the same way.
      (1) $I = \frac{E}{R}$, or current $= \frac{\text{electromotive force}}{\text{resistance}}$, or amperes $= \frac{\text{volts}}{\text{ohms}}$ (on blackboard).
      (2) Formula can then be inverted: $I = \frac{E}{R}$; $E = I \times R$; $R = \frac{E}{I}$
      (Check this on board with simple numbers.)
   e) Let us look closer at the terms used.
      (1) *Ampere* — That amount of current which will flow in a given circuit with an applied e.m.f. of *one volt* and a resistance of *one ohm.*
      (2) *Ohm* — That amount of resistance which allows *one ampere* of current to flow when the applied e.m.f. is *one volt.*
      (3) *Volt* — That amount of electromotive force which steadily applied to a conductor whose resistance is one ohm will produce a current of one ampere.
      (4) Where did these names come

from? (Men who helped discover them — Ampere, Ohm, Volta.)

f) Why does adding to lights in series make them all dimmer?
   (1) Why doesn't this happen in parallel circuits?

g) Voltage drop through resistance (I times R).
   (1) Series circuit (IR drops equal to applied e.m.f.).
   (2) Parallel circuits (IR drops across each R same if resistances are of equal value).

h) Power (P = E × I).

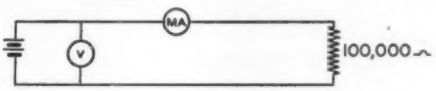
4. *The principles of Ohm's law can be shown by means of a demonstration.* (Give demonstration — Demonstration Sheet No. 4.)
5. *Summary*
   a) How can you use Ohm's law that we have studied today?
   b) How is Ohm's law expressed?
   c) Complete the following:
      (1) $I = \frac{?}{?}$
      (2) R = ?
      (3) E = ?
      } Write on board.
   d) Ampere is
   e) Current is
   f) Volt is
      } Refer to definitions on the board.
6. *Assignment*
   a) Competent radio electricians must have an understanding of magnetism and its effects.
   b) Next lesson introduces this topic.
   c) Study Chapter 5 in your text book.
   d) Look for these points. Study them carefully.
      (1) What is magnetism? How is it produced?
      (2) What is meant by repulsion and induction?
      (3) What is meant by the North Pole on a magnet? South Pole?
      (4) How are lines of force created?
      (5) These and other points are included in the written material that you are to read.

Demonstration Sheet No. 4
Electricity and Magnetism
Ohm's Law

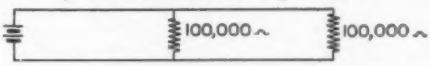
Objective: To demonstrate the relationship between current, voltage, and resistance.

Equipment and Materials:
1 ea. Resistance board
1 ea. D.c. milliammeter (0-1 ma.)
1 ea. Hickok electronic voltmeter
1 ea. 45-volt battery

Procedure:
1. State purpose of demonstration:
   a) The relationship between current, voltage, and resistance must be well understood for these are the three fundamental quantities upon which the whole subject of electricity is based.



   b) Connect the following circuit:
      (1) By using Ohm's Law, solve for I; E = 45 V and R = 100,000.
      (2) Measure current, voltage, and resistance.
      (3) Calculate percentage of error and compare it with allowable tolerance on resistor.
   c) Connect the following circuit:



      (1) Solve for the combined resistance using parallel resistance formula.
      (2) Solve for I in entire circuit.
      (3) Solve for I in R_1 and R_2.
      (4) Make measurement of I in entire circuit.

      (5) Make measurement of I through R_1 and R_2.
   d) Connect the following circuit:
      (1) Measure IR drops across R_1, R_2, and R_3. Show that the sum of the IR drops is equal to applied e.m.f.
   e) Answer questions asked by students at close of demonstration.
   f) Summary (use points listed on lesson plan).

Job Analysis Basic to a Course of Study in Distributive Education

MURRAY BANKS*

It is impossible to set up an effective program for training salespeople until the exact nature of the selling activities for which they are to be prepared is known. This information, which may be obtained only through an analysis of specific job activities, should be used as a basis in determining the objectives, content, organization, and management of the training program.

In order that this discussion may be very specific in presenting the problems of job analysis basic to a course of study, this article will recount in detailed form the steps taken in making the duty or job analysis for representative retail selling positions in Millville, N. J.

In this article, the *method* used will be emphasized. A later article will discuss the steps followed in constructing a curriculum based on the job analysis.

The Objective of Job Analysis

The problem of the construction of a curriculum which will insure properly trained distributive workers may be solved by a study of the duties performed by retail salespeople on the job.

The primary objective in analyzing the retail selling positions available in Millville stores was to determine what specific units of instruction might justifiably be included in a course of study for the cooperative part-time students.

It was, therefore, decided to determine what retail salespeople in Millville stores did, which of these duties they regarded as easy to learn, and which of them they regarded as difficult to acquire. The problem of constructing a realistic and functional course of study would then be greatly simplified.

Lomax, in discussing the problem of activity or duty analysis, says:[1]

> The problem of activity analysis resolves itself in the field of commercial education into a practical problem of occupational analysis, which is a method of determining the component elements of an occupation in relation to the qualifications of the worker who performs the occupational duties.

The limitations of the occupational analysis method is given by this same writer:[2]

> It is not enough that we know the legitimate uses of a method. We need also to know the limitations of the method in order that we, by means of the method, may accomplish permanent and highest good. This is particularly true of the occupational analysis method in commercial education.

Four limitations are presented for the consideration of teachers of vocational commercial subjects:[3]

1. The method of occupational analysis is not yet highly refined.
2. The method of occupational analysis "involves us in the question of transfer of training."
3. The method of occupational analysis reveals what men actually do at work but not what men should do.
4. The method of occupational analysis differentiates men at work into a

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[1] Paul S. Lomax, *Commercial Teaching Problems* (New York: Prentice Hall, 1928), p. 74.
[2] *Ibid.*, pp. 77–80.
[3] *Ibid.*, p. 80.

multitude of duties and character traits but does not integrate such for control and solution of new problem situations.

Tonne makes the following comments regarding the job or occupational analysis:[4]

The job, or occupational analysis is the second step in the process of course making. The first step is the determination of the goal of the course. It deals with the determination of the specific activities and traits required on the job.

This writer says, with regard to the limitations of this method, that:[5]

An occupational analysis presents a picture of the men working at specific, and often minute tasks. It does not synthesize seemingly unconnected segments into the unified process.

The job analysis presents only the occupational bases for making a course of study, although usually there are other purposes for which the course is given.

The job analysis is fairly satisfactory for routine or mechanical occupations; but when the activities are primarily mental, the analysis can reveal only a fragment of the responsibility of the employee.

In spite of its limitations, the job analysis is still the best foundation on which to construct a course of study; and with proper refinement, many of its weaknesses may be reduced to insignificance.

An example of the analysis of a simple job is that of the position of application clerk in a department store, which is given as follows:[6]

1. Meets people who desire to open accounts.
2. Asks them for the information to fill out blanks.
3. Writes form letters or telephones for references.
4. Fills out mercantile agency blanks.
5. Looks up ratings in Dun's, etc.
6. Files applications temporarily until references come in.
7. Makes notes of references on blanks, and hands to credit chief who passes on them.
8. Enters name, address, and number of applications in index.
9. Answers requests from other firms for references.

In this list are shown nine duties which the application clerk has to perform, and clearly the course of study needed to train such a clerk will deal with the nine topics.

It should teach him how to meet people who desire to open accounts, how to ask them for information with which to fill out blanks, how to write form letters, how to get information over the telephone, etc.

When the student has been taught each of these topics according to ideals which would necessarily be included, all the theory needed by him has been presented.

Duties Versus Performance

To avoid confusion at this point or later, it is advisable to remark that an analysis may result either in a list of duties, or in a list of methods of performing the duties.

There is no line of demarcation between duties and their performance, because the methods of performing any duty are simply the details constituting a larger activity called the duty. For instance, in the case of the application clerk, a number of duties are listed such as meeting customers, and asking for information. But this list does not state the detailed activities utilized in performing such a duty; it does not show what one would actually do in "meeting customers." If, however, we should analyze the duty of meeting a customer, we would obtain yet another list of component duties, such as greeting her courteously, asking her to take a seat, inquiring into the object of her visit, and the like. This, then, would be a duty analysis, its units combining to constitute the method of performing the duty of "meeting customers."[7]

Related Investigations

A thesis was written on the subject, "Job Analysis and Curriculum Construction in the Metal Trades Industry," by Walter B. Jones, Ph.D., of Columbia University in 1926.[8]

The method he used is summarized in the following ten steps:

Step 1. The objectives of the curriculum were formulated.

Step 2. Job specifications containing all the important activities and duties of the occupation were investigated and tabulated. These data were collected from literature, from conferences with journeymen, patternmakers, teachers, and by introspection.

Step 3. Certain activities and items from the job specifications were selected and put in check list form. Provision was made on the check list for collecting items of "related information."

Step 4. The products manufactured at the plant were classified into 28 major groups and three to five sample drawings were selected from each group; 125 drawings in all were selected for detailed analysis and study.

Step 5. Typical samples of the company's products obtained in step 4 were analyzed.

Step 6. A Trade Element Chart was prepared. This shows the frequency of occurrence of specific items.

Step 7. An outline of instruction was made.

Step 8. Unit instruction sheets were written, which consist of two types — units of standard operation and units based on the jobs analyzed.

Step 9. Standards were established and results of instruction were measured.

Step 10. Forms for reporting work were completed and forms for progress made, were devised.

Strong and Uhrbrock have written a book entitled *Job Analysis and the Curriculum*[9] The purpose of this book is to aid business in recruiting men of executive ability. These authors feel that an extensive study of real conditions in industry is needed so that the number of different types of executives in existence may be known and more scientifically selected.

After these facts were collected, they knew what objectives were to be accomplished by a curriculum and knew what new courses were to be developed to meet these objectives. When they had listed all the habits utilized by an individual in a job specification, and with the objectives evaluated, the material was ready for the printing curriculum which they devised.

Christine Anderberry has written a thesis, "Job Analysis and Employment Relations in Store Salesmanship" at the University of Southern California in 1930.[10] The purpose of this thesis was to collect data for the job analyses and employment relations of four different types of salesmanship.

Sources of Data

The data used in making the duty analysis in Millville were obtained from the cooperative part-time trainees, salespeople of local stores, merchants, buyers, heads of departments, literature, from the volume, *U. S. Descriptions for the Retail Trade*, published by the Federal Department of Labor,[11] and the book, *Occupations in Retail Stores* by Dorothea DeSchwienitz.[12]

Procedure Followed in Making the Duty Analysis

Preliminary List of Duties

A preliminary list of duties was gathered through the means of a round-table discussion of 26 cooperative part-time trainees performing retail sales duties in representative selling jobs in Millville.

For the sake of convenience in locating the various duties, this preliminary list was classified under six different headings: (1) customer contact, (2) store relations and nonselling duties, (3) system, (4) care of stock and equipment, (5) merchandise knowledge, and (6) miscellaneous duties.

After the complete list of 154 duties had been assembled, it became evident that each and every one of them could be placed under this tentative grouping. It was therefore, determined to retain it as a permament classification.

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[4]Herbert A. Tonne, *Business Education: Basic Principles and Trends* (Gregg Publishing Company, 1939), p. 142.

[5]*Ibid.*, p. 143.

[6]W. W. Charters, *Curriculum Construction* (New York: The Macmillan Company, 1923), p. 35.

[7]*Ibid.*, p. 37.

[8]Walter B. Jones, *Job Analysis and Curriculum Construction in the Metal Trades Industry* (New York: Teachers College Contributions to Education, Columbia University, 1926).

[9]Edward K. Strong and Richard P. Uhrbrock, *Job Analysis and the Curriculum* (Baltimore: Williams and Wilkins Company, 1923).

[10]Christine Anderberry, "Job Analysis and the Employment Relations in Store Salesmanship." Master's Thesis (Los Angeles: University of Southern California, 1930).

[11]William H. Stead, *Job Descriptions for the Retail Trade*, Vols. I, II, and III (Washington, D. C.; United States Printing Office, 1938).

[12]Dorothea DeSchweinitz, *Occupations in Retail Stores* (Scranton: International Textbook Company, 1938).

Certain weaknesses in the classification are apparent, but, since the classification does follow certain well-known lines of sales work, and since the individual duty rather than the class, is under consideration, it was believed that such weaknesses could be disregarded. An ideal classification would admit no miscellaneous group as there is no definite basis for training to be found in such heterogeneous duties.

It will also be noted that there is some overlapping among the groups. This is due to the fact that certain duties classified under one group might with equal propriety have been placed under another group. Overlapping was not considered a disadvantage and no attempt was made to avoid it.

The headings under which the duties performed by salespeople were classified were determined from a list of duties which Lord and Taylor classified after analyzing five hundred selling jobs in that organization.[18] This classification was found to be a convenient one and one in which it was possible to assign all duties mentioned.

The procedure followed in the round-table discussion to secure the preliminary list of duties was as follows: each of the headings of the classification was first listed on large blackboards. The salespeople then called off in detail and in sequence the various duties which they performed in their daily work. Each duty was listed under the appropriate heading on the blackboard. Duplications were thus readily eliminated. All duties, no matter how minor, were listed even though they were mentioned but once.

To this preliminary list were added additional duties secured through a study of the United States publication, *Job Descriptions for the Retail Trade*, and of *Occupations in Retail Stores*.

These duties were mimeographed and distributed to each worker enrolled in the cooperative part-time course in distributive education in the high school after a period of one week, and then after a three-week period, with instructions to re-examine the list and add any other duties which they performed and which may have been overlooked.

Additional duties were added by the investigator who spent days in the stores watching methods and processes, chatting for a moment with a salesperson, cooperative part-time worker, supervisor, head of stock, or anyone who had time to talk. All the employees knew what the investigator was after and were interested in giving any information they had. Care was taken at all times not to be in the way and to build confidence.

A preliminary duty list was first prepared in this fashion. Duties were listed in consecutive order and reduced to simplest terms. After a visit to the stores, new duties that had been observed or which had been learned through conversations were added to the list. In this way the duties of the salespeople gradually were inventoried.

In this manner a fairly complete picture of a salesperson's job was obtained. It represents as complete a statement as was obtainable in the time spent on the survey which covered a period of several months. It is possible, however, that a few duties which are performed at rare intervals may have been overlooked.

The Final Duty List

After the interviewing had been finished and written up, and after the preliminary list had been expanded in the manner outlined, a composite list of all the duties which had been collected was prepared. The composite list contains 154 duties.

This composite list of duties was duplicated and made the basis of approach for the collection of the desired information, basic to the construction of a course of study.

Selection of the Interviewees

A typed sheet headed "Directions for Duty List" and an accompanying letter was sent to salespeople. A copy of the list and the letter will be found at the end of this article.

In sampling the field from which salespeople were to be interviewed and given questionnaires, it was decided to give major attention to the individual salespeople selected and to the type of store in which they were employed.

Salespeople were, therefore, selected who were either personally known to the investigator or to the cooperative part-time trainees, and recognized as workers who were performing a high grade of service and who would be willing to take the time to complete the questionnaire.

Distribution of Interviewees According to Type of Store

Selection according to occupational distribution was based upon the occupational classifications found in the United States Census Report for Retail Trade for 1940.

The distribution of the types of stores investigated was as follows: (1) grocery and food stores, (2) apparel stores, (3) shoe stores, (4) furniture stores, (5) service stations, (6) drugstores, (7) hardware stores, and (8) variety stores.

In a general way interviews were allotted to the eight classes in proportion to the number of salespeople employed in those classes, but this numerical distribution was not adhered to too closely because of the larger or smaller range of duties within these occupational groups.

Distributing and Collecting the Duty Lists

The 26 students in the retail selling course aided in distributing and collecting the duty lists. Each student was responsible for delivering and calling for the questionnaires. In this manner it was possible to secure a large number of satisfactory returns in a comparatively short space of time. One hundred and twenty questionnaires were distributed. Of this number, 78 questionnaires were returned and tabulated.

Classifying and Compiling the Results

From the final returns on the duty list and its accompanying direction sheet, two major groups of data were secured: a difficulty of performance tabulation, and a frequency of performance tabulation.

Tabulating the Returns

The procedure in tabulating the returns was as follows: one of the clerical workers read off from each duty list the duty performed with its number on the printed list, while another clerk recorded the tally marks upon a master sheet against the duties as called off.

This was done for each of the two groups of data secured. Two master sheets were therefore made, one for each of the data groups, and from these master sheets all the data for frequency counts were obtained. The figures were checked for accuracy in two ways; the worker added the tally marks across one way and then back again, and after they had been added, she went through and did a random sampling of perhaps twenty to check up on her accuracy.

The duties as gathered through questionnaire and interview were analyzed and classified according to frequency of performance, and difficulty of performance. A difficulty analysis indicates the duties and information upon which special emphasis must be laid in the curriculum.

Having made such an analysis it is now possible to proceed to construct a program of training which will supply to the worker the needed information and skill, and guarantee him a well-rounded training.

An article on the construction of a curriculum based on job analysis will follow.

Directions for the Duty List

1. Put a *check mark* before all those duties which you perform in your present position.
2. Add at the end of the list (or at the side under the appropriate headings) any duties which you are ever called on to perform which do not already appear on this list.
3. After you have checked your list in this way go over it again and put a *plus* mark after those duties which were the most difficult for you to learn when you first started on this work.
4. Now go over the list again and put a *minus* mark after those duties which were the easiest for you to learn.

Customer Contact

1. Meet customers.
2. Approach customers.
3. Greet customer.

[18] Thomas V. Morton, "Traits and Duties Required of Retail Salespersons in Department Stores," Master's Thesis (New York University, 1933).

4. Seat customer.
5. Size up customer.
6. Determine what customer wants.
7. Question customer.
8. Present merchandise.
9. Center attention on goods.
10. Display goods.
11. Demonstrate goods.
12. Answer questions about merchandise.
13. Meet objections to merchandise.
14. Meet objections to firm.
15. "Talk up" merchandise.
16. Help customer select right merchandise.
17. Help customer try on merchandise.
18. Convince customer.
19. Close the sale.
20. Help customer decide alterations needed.
21. Try to increase average sale.
22. Make exchanges.
23. Make adjustments.
24. Handle customer complaints.
25. Handle phone orders.
26. Handle phone complaints.
27. Take deposits.
28. Give prices and estimates over phone.
29. Receive phone messages.
30. Direct customers in store.
31. Wait on several customers at once.
32. Collect bills at customer's home.
33. Handle customer with relief stamps.
34. Phone customers about "specials."
35. Recommend services, such as credit, etc.
36. Notify customers when promises must be broken, etc.
37. Handle mail orders.
38. Make service calls.

System

39. Write sales checks.
40. Check invoices.
41. Operate cash register.
42. Take inventory.
43. Keep record of returns.
44. Report mark downs.
45. Check counter.
46. Calculate what the customer is to pay.
47. Write requisition for supplies.
48. Wrap packages.
49. Wrap returns to vendor.
50. Write out refund slips.
51. Write out credit slips.
52. Write "lay away" slips.
53. Mark price tickets.
54. Write register error slips.
55. Check reserve stock.
56. Keep records of spoilage.
57. Sign in and out for work.
58. Mail packages.
59. Figure sales tax.
60. Gift wrap.
61. Make out bank slip.
62. Turn in money to office.
63. Keep record of sales.
64. Keep want slips.
65. Make change.
66. Accept and approve checks.
67. Give discounts.
68. Calculate earnings.
69. Rearrange counters.

Care of Stock and Equipment

70. Arrange stock on counters.
71. Dust counters.
72. Keep counters filled.
73. Press garments and sew buttons.
74. Oil machines.
75. Clean and arrange display shelves.
76. Put away incoming stock.
77. Mark stock.
78. Keep reserve stock complete.
79. Repair fixtures.
80. Brush stock.
81. Dust the hangers.
82. Cover the stock at night.
83. Replace damaged stock.
84. Relay seasonal stock.
85. Keep stock in order.
86. Size stock.
87. Return stock to proper place.
88. Repost slow selling merchandise.
89. Keep stock room in order.
90. Open cartons.
91. Inspect incoming merchandise.
92. Remove and distribute merchandise.
93. Report merchandise out of stock.

Store Relations and Nonselling Duties

94. Give training to other employees.
95. Read merchandise manuals.
96. Help other employees.
97. Review shopping reports.
98. Confer with employer about progress.
99. Confer with employer about merchandise.
100. Confer with employer about customers.
101. Confer with employer about credit.
102. Confer with employer about policies.
103. Wear regulation clothing.
104. Make change for other employees.
105. Wait on other salespeople's counters.
106. Cooperate with employees and employer.
107. Know what merchandise store carries.
108. Acquaint other employees with new merchandise.
109. Run errands for employer and employees.
110. Do comparison shopping.
111. Clean and sweep store.
112. Clean store fixtures.
113. Clean windows.
114. Sweep front of store.
115. Make signs.
116. Write copy.
117. Aid in making window displays.
118. Check awnings and window curtains.
119. Turn counter lights on and off.
120. Distribute stock.
121. Address sales promotion cards.

Merchandise Knowledge

122. Uses of the product.
123. How the product will perform.
124. What it is made of.
125. How to use the product.
126. Competing goods.
127. Services available with the product.
128. Understand labels on merchandise.
129. Interpret meaning of labels.
130. Price lines available.
131. Quality.
132. Sizes.
133. Launderability.
134. Construction details.
135. Points of superiority.
136. Source of product.
137. Colors.
138. Styles.
139. Standards.
140. Replacements.
141. Quantities.
142. How to care for product.
143. Assortments.

Miscellaneous

144. Deliver circulars.
145. Receive salesmen.
146. Write reorder letters to manufacturers.
147. Write good will letters.
148. File forms.
149. Hire employees.
150. Type letters.
151. Use adding machine.
152. Operate floor wax machine.
153. Make alterations.
154. Make deliveries.

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To a Selected Group of Salespeople:

We have attached a very interesting list of duties performed by salespeople which we obtained by interviewing a number of salespeople and merchants in Millville. We need to know now what duties are performed by the greatest number of people engaged in this work. You have been nominated as one of a selected group who can give us intelligent help with this study, so we are asking you to check the list of duties as you read it, according to the directions which you will find on page one.

You know how easy it is to put off doing a thing like this unless you do it immediately, so try to do it in the first twenty minutes you have free. Then return it to the person who gave it to you when he calls on you again. We shall certainly appreciate your help.

We are doing this work in an attempt to make the course of study for salespeople in Millville as practical as possible, and we think the best way to do this is to find out what they actually do on the job and then give training for these duties.

If you would be interested in seeing the final results of this study, we should be very glad to send you such material as we get out.

Very sincerely yours,
Murray Banks—
Co-ordinator.

Please fill in the following blanks first:

Name..... Store.....
Position.....Merchandise sold.....

You will find attached a long list of duties performed by salespeople. Of course, no one salesperson could possibly perform all these duties while in any one position, but every salesperson has to perform a number of them, so what we want you to do is this: Please read the instructions very carefully. Then go through the list making the marks indicated in the instructions. Please add any additional duties, no matter how minor they may seem.

Education for work — vocational education — has become increasingly important with the great scientific advancement of the past half century. From the laboratories of the nation, from the genius of its people, have come inventions and developments which have revolutionized industries, making one occupation obsolescent and at the same time creating entirely new fields calling for new skills, techniques, and training. And this era of scientific brilliance does not appear to be even approaching its climax; innovations and developments are now assured which will bring new demands from the agricultural, the business, and the industrial world for workers equipped with the required new skills, new knowledge, new abilities.

— *The Michigan Program for Vocational Education*

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

John J. Metz, Editor

Encouraging Boys to Finish High School

In these days of unrest and turmoil where every man is striving to do something to further the war effort, it is not at all strange that the students in school should also be influenced by a restless feeling which may influence many to leave high school before they have finished their courses.

These boys ought to be seriously advised against doing this. They are interrupting if not permanently ending their chances for finishing an educational plan which they had worked out individually or with the aid of others for their future life.

The economic conditions of the past ten or more years have brought about a condition which the present ease of getting employment may abrogate for a while, namely, the insistance by many employers that the boys hired for certain work, especially for entry into any apprenticeship agreements must be graduates of a high school course.

Naturally, now that labor is at a premium, high school graduation is no longer insisted upon, and almost any boy who has attained the legal age for leaving school can get some kind of a job at good wages.

However, in a few years from now, that boy is inducted into the army, and when this present war ends, he may be of an age that finishing his high school course may be entirely out of the question.

The past has shown that wars are always followed by depressions, and employers will again demand high school graduation for learning a trade. Boys must be shown that it is highly dangerous to let their present unrest wreck their future lives. Teachers must encourage them in every way to let nothing interfere with obtaining a high school diploma.

The Bicycle as a Traffic Hazard

Many schools offering automotive courses do excellent work in training their students to become safe drivers. Unfortunately, there are many more schools which do not offer safe driving instructions as a part of their automotive course. Naturally, any teacher of auto mechanics will at once admit that safety on the road is vital and that it ought to be taught together with safety in the shop, and as a part of the principles underlying the care and operation of the automobile.

At present, however, the automobile is becoming less hazardous in the hands of the high school student because conservation of rubber and gas rationing are doing their part in reducing this type of traffic. Another hazard has appeared, however, which will need to be corrected at once, and that is the bicycle, the number of which has risen steadily within the past few years, despite the fact that selling restrictions are in force at present.

Laws are in existence, in some communities, forbidding two or more cyclists to ride abreast. In spite of this it is a common sight to see four and more students riding abreast, weaving back and forth across the road, playing pranks and doing acrobatic stunts on their wheels, while on their way to and from school.

Many of these youngsters have paid with their lives for their inattention while riding their wheels. A safety campaign to make students safe bicycle riders, therefore, seems important. It will not take much schooltime to inaugurate it, and since such a course is needed right now, this is the time to begin.

The Annual Index

This is the last issue of Volume 31 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION. The annual index, therefore, has been inserted into this number. It may be well for the subscriber to scan this index, if for no other reason, than to see whether something that may be of importance has escaped his eye when he scanned the individual magazines as they came off the press month after month during the school year.

The titles have been gathered under subject headings. This is helpful when looking up materials for definite shop subjects such as woodwork, machine shop, print shop, and the like.

There also is an author's index. This, too, is of great importance, because in it are contained the names of the leaders in the fields of industrial arts and vocational education. This list also is important to teachers who feel that the material appearing in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION may be written by men who are in school shops or on school levels which differ from those over which the reader presides. Not infrequently some readers complain that material in the problems and projects section is too far advanced for students on this or that level of schoolwork. A study of the offerings and of the authors who contribute the work will show whether or not someone else is doing work with his students that the reader feels he cannot accomplish with his.

Probably the work is too difficult for a given grade, but it may be well to investigate why the author of a given article succeeds where others fail. Probably a letter to the author may start a flow of correspondence which may not only be enlightening but also enjoyable. Most of these men who take time to write for their field, are able men whom it is a pleasure to know, even if it is only through correspondence.

The index has been inserted into the center of this issue. Study it, and make use of it.

Our Women Mechanics

Women trainees in our war-production program are demonstrating conclusively that there are many jobs in industry which women workers can do as well or better than men ever performed them.

As more and more of our men are needed in our armed forces, women will have increasingly more opportunity to show the world how well they can do men's jobs.

At present there are over one and one half million women working in war industries. This number, according to the present outlook, will have to be increased by four to five millions in 1943. That means that the schools are confronted with an enormous task of developing at least elementary skills in thousands, nay millions, of students who, up to now, have had very little opportunity to get any training in the handling of the tools of industry.

At present these women workers are found to be especially efficient at light assembly work and machine-shop work, inspection, and aircraft bench-metal work, woodwork, and riveting.

Many women have also trained themselves to do welding, but some medical authorities are against women in this particular type of work. It is well to get authoritative information on this question before offering this work to women in the future.

Work—A Realistic Laboratory

LEO F. SMITH*

"For all youth, it would be a great improvement over the present condition of affairs if the principle were wisely accepted that formal education should not be continued beyond the twelfth or thirteenth grade without several months of experience in some realistic form of gainful employment. Certainly a period of at least six months full-time or twelve months half-time experience would not be too much to expect at this point in personal development."[1]

Thus a committee of outstanding businessmen and educators recognize the necessity for a long-range program adjusted to the realities of the present. In this program work is visualized as being of vital importance and as a factor which should be given intensive thought if schools are to prepare adolescents to take their place in the postwar world. Numerous other references might be cited indicating the increasing sensitivity of educators and businessmen to the need for a more realistic type of secondary curriculum, and the purpose of this paper is to furnish annotations which describe several aspects of school programs where a solution to the problem is being sought.

As one aspect of the three-year study of cooperative work programs[2] with which the writer is primarily concerned, a survey was made of the literature on this subject. Altogether more than 700 references were discovered which touched on cooperative or diversied occupations programs at the secondary, junior college, and college level. Although these may be classified by levels of education, it appeared that a more worth-while classification might be made according to the methods which had been employed in organizing, administering, and evaluating this type of program. With this thought in mind, the following references have been chosen as those which it is believed would be of greatest interest to secondary school administrators. In selecting these articles the following criteria have been utilized: (1) Are the techniques which have been described in securing the cooperation of those concerned — the schools, industries, communities, and student — applicable in other localities? (2) Are the methods of co-ordinating the schoolwork program sufficiently unique to widen horizons for other administrators? (3) Is this a follow-up study or evaluation which indicates the effectiveness of this type of program for all concerned? and (4) Does this present something of value concerning the philosophy and objectives of cooperative education?

*Co-ordinator, Rochester Athenaeum and Mechanics Institute, Rochester, N. Y.

[1] *"Youth and the Future,"* The General Report of the American Youth Commission of the American Council on Education, Washington, D. C., 1942, p. 25.

[2] *Report on Terminal Education in Junior Colleges: RAMI Project — Use of Cooperative Work Programs,* Junior College Journal, XI (May, 1941), 621.

Organizing Cooperative Work Programs

Carmichael, H. W., "Information Concerning the Organization of Vocational Part-Time Classes for Trade and Industrial Workers." State of Iowa; Board for Vocational Education, Des Moines, Iowa. Misc. T. I., 39; January, 1938.

Presents information designed to assist school administrators in organization of vocational part-time trade and industrial classes. Purposes, methods of instruction, pupil qualifications, and plans for co-ordination of part-time trade extension classes, general continuation, part-time classes, and part-time cooperative courses are outlined.

Davis, Benjamin F., "A Diversified Occupational Program, Its Origin, Establishment, and Operation." *Journal of Business Education,* 13:11–12, June, 1938.

The realization of the need for the provision of a more comprehensive vocational training program which preceded the passage of the George-Deen Act is mentioned and the points which should be kept in mind by any individual charged with coordinating such courses are discussed. An outline of the duties of the co-ordinator and a listing of steps through which the learner should proceed make this reference of interest.

Diversified Occupations — "Handbook for Co-ordinators," Department of Industrial Education. A. & M. College of Texas, College Station, Tex., October, 1935, 97 pp. mimeographed.

Aims, advantages, duties of co-ordinator, and suggested plan of operation for diversified occupations programs are outlined. Methods of making occupational surveys and establishing advisory committees are suggested. Cautions to be observed in selecting pupils and techniques for relating subject material are presented. Job analyses and miscellaneous forms are included.

Eldridge, H. D., "Putting Pupils to Work in Diversified Occupations," *The Nations Schools,* pp. 25–27, December, 1940.

Techniques are suggested for making community job opportunity surveys as a prerequisite to initiating a diversified occupational training program.

Graham, Robert F., "A Handbook for Co-operative Part-time Apprentice Training," Unpublished Master's thesis, 1936, Oklahoma A. & M. College.

Presents, in handbook form, procedures and references for use by school authorities interested in inaugurating a program of co-operative part-time apprentice training. Suggests making use of all available industrial and commercial facilities of the community on a cooperative basis, with the salary of the co-ordinator and the technical reference materials as the only expenses for the service.

Hankins, Thomas L., "A Manual for Co-ordinators of Part-Time Classes in Miscellaneous Occupations." Department of Industrial Education, University of Kentucky, January, 1940, 19 pp. mimeographed.

This manual presents the latest information available on federal and state laws applicable to worker pupils, and the regulations of the State Department of Education for part-time cooperative classes. Techniques for surveying the community, setting up advisory committee, publicizing the program, finding employment for part-time pupils, selecting pupils, making job analyses, observing pupils on the job and making follow-up studies are suggested.

Hurley, Morris E., "Essential Steps in a Co-operative Education Program." *Industrial Education,* 30:329–31, March, 1929.

The author points out four fundamental steps in the organizing of a cooperative training program. These are: (1) trade analysis, as a basis for development of the curriculum; (2) survey of the cooperating plant to determine if it offers training potentialities; (3) training responsibility of the school to ascertain that essential elements of training are properly allocated, and (4) the responsibility of training the student as a worthy citizen.

Miles, Lillian E., "No Experience, No Job — So What?" *American School Board Journal,* 97:19–21, July, 1938.

The San Bernardino (Calif.) High School plan for cooperative vocational education is described. Four problems were encountered in initiating the program: (1) formulating plan which would meet approval of State Department of Education; (2) provision for protection of students by means of liability insurance; (3) administering plan so that it would continue on a successful basis; and (4) selling cooperative idea to the community. The community interests represented on the advisory committee and methods of checking student progress are mentioned.

"Part-Time Cooperative Trade Training." Nebraska State Department of Vocational Education, *Bulletin No. 33,* 8 pp., April, 1940.

The definition of part-time cooperative trade training, requirements for reimbursement, advantages to student and school, cooperative responsibilities, success factors and occupations which lend themselves to this type of training are presented.

Virginia — "Vocational Education for Diversified Occupations," Division of Trade and Industrial Education, State Board of Education, Richmond, Va., 11 pp., mimeographed.

A definition and description of the manner in which Virginia schools can take advantage of coalitional training opportunities offered by business and industrial establishments. The question and answer method is employed to bring out factors of interest concerning diversified occupations program.

Weaver, G. G., "Some Problems of Cooperative Education." *Industrial Education Magazine,* 32:352–5, May, 1931.

A discussion of several factors which must be considered in the establishing of any program of cooperative education. These factors are: (1) adapting program to local school conditions; (2) obligations of school to students and to industry; (3) obligations of industry to school and trainee; (4) organization of course; (5) length of course; (6) content of course; and (7) administrative problems of co-ordinating the school-work program. The advantages of a cooperative program to the individual and community are mentioned. A valuable reference in providing a brief survey of aspects to be considered before initiating the co-operative type of training.

Administering Cooperative Work Programs

Dalthorp, Charles J., "A Cooperative Work Study Plan." *Business Education World,* 20:781–4, May, 1940.
Presents philosophy which guided formulation of cooperative program in Central High School, Aberdeen, S. Dak. The curriculum, techniques of placement and co-ordination are discussed. Employer's evaluation sheet and student-employer agreement are interesting forms included.

Gronseth, H. E., "Ford's Vocational Schools." *Automotive Industry,* 75:276–8, Aug. 29, 1936.
The plan utilized by the Ford Motor Company in training young men and the manner in which classwork is synthesized with practical training are presented. An interesting reference in describing a technique utilized in industry.

Lombard, Charles W., "Diversified Occupations Co-ordinated." *Industrial Arts and Vocational Education,* 29:219–21, June, 1940.
This article defines "diversified occupations programs" and presents an outline for developing such a program in auto mechanics, such as was employed at Murray Vocational School, Charleston, S. C. The purpose of preliminary survey; duties of the occupational committee; administration of the program; student progress record; types of related instruction which should be offered; and student work reports are all discussed. Examples of the student progress records and work reports are included. A valuable reference for techniques utilized in one type of cooperative training program.

McDougall, R. E. C., "Cooperative Vocational Education." *Industrial Arts and Vocational Education,* Vol. 28, pp. 122–3, March, 1939.
Description of the organization of a co-operative vocational school at Orrville, Ohio. The philosophy, duties of co-ordinator, personnel of school, organization and operation, and local interest in program are presented. A rather unique plan on the secondary level in that the students alternate two weeks schooling with two weeks on the job and receive pay for their services after attaining a certain degree of efficiency.

Michigan — "Apprentice Training Program in Diversified Occupation — For Enrichment of the High School Program." *Bulletin No. 231,* State Board of Control for Vocational Education, Lansing, Mich., 45 pp., 1937.
The definition, length of course, employment status, use of advisory committees, duties of co-ordinators, and other factors essential to success of diversified occupations program are presented. Appendix includes interesting examples of forms used in Michigan.

Sutton, Traver C., "The Co-ordinator in Co-operative Trade Education." *Machine Age,* Vol. 37, p. 621, April, 1931.
Co-ordinator at Wilbur Wright Cooperative High School (Detroit) outlines five chief duties of co-ordinator: (1) convincing employer of advantages of cooperative training; (2) organizing advisory committee; (3) counseling students; (4) providing for school shop training during periods of slack employment; (5) check to see that student is given work with training possibilities.

Determining the Effectiveness of Cooperative Work

Arnold, Frank J., "A Study of the Cooperative Method of Education in the New York City High Schools." Doctor's, 1932, New York, 139 pp.
Data was secured from the employers of cooperative pupils in New York City and the school authorities who have the co-operative work under their supervision. Replies to a questionnaire sent to employers of cooperative pupils seem to indicate that a further extension of the cooperative plan is feasible and desirable.

McHenry, R. B., "Measuring Accomplishment in Cooperative Part-Time Training." *Industrial Arts and Vocational Education,* September, 1941, pp. 284–286.
Description of results of survey made among one hundred co-ordinators to determine evaluative methods employed to measure students' progress in job training, related studies, and development of desirable personality traits and attitudes. Plea is made for setting up of a program which would measure more objectively progress of trainees in various areas and occupations.

Parriott, Charles, "The Community in the Educational Program." Master's, 1936, University of Nebraska, 104 pp.
Investigates a cooperative plan of education in 40 schools, through which business and industry cooperate with schools in offering specific vocational training on the job while schools furnish cultural and related training. Finds the plan is favored by people of the communities studied; that students who learn vocations are able to hold jobs; that it helps relieve unemployment and that most of the vocations taught are found in most of the Nebraska small towns.

Report of the Committee, "The Advisory Committee on Education." U. S. Government Printing Office, Washington, 1938, Supt. of Public Documents, 35 cents, pp. 77–78.
Several unwholesome aspects of cooperative vocational training plans which have come to the attention of the committee are pointed out. These are: (1) employment of pupils at wage rates well below the minimum level; (2) trainees working for as many as 20 hours per week with no pay whatsoever; (3) recruiting of an excessive number of trainees with no regard to possibilities of industrial needs, and (4) sales of products of finished merchandise at prices below prevailing market.

Russell, John D., and others, "Vocational Education." Staff Study, No. 8. The Advisory Committee on Education, U. S. Government Printing Office, 40 cents, 1938.
In this report the authors make numerous references to cooperative programs. The dangers inherent and the possibilities of exploration of students which may result from improperly supervised and co-ordinated programs are emphasized.

Sharkey, Clare G., "Vocational Achievement of Graduates of the Trades and Industries High School, 1916–1930." Unpublished Master's Thesis, Wittenberg College.
Covers the vocational achievements of 786 graduates between years 1916–30 of Trades and Industries division of the Dayton Co-operative High School, Dayton, Ohio.

Cooperative Programs in Action

Addington, L. F., "Students Learn While They Work" in *Virginia Journal of Education,* 31:201–3, February, 1938.
General description of diversified occcupational program in S. Boston (Va.), Portsmouth (Va.), and Charlottesville (Va.) High School. The industries and stores that offer training possibilities, the methods of selecting students, the students work-study program, the committees necessary, the duties of the co-ordinator and the advantages of this type of training are presented briefly.

Barrett, L. A., "Getting Jobs on Graduation." *Industrial Arts and Vocational Education,* 28:210–11, May, 1939.
General description of techniques utilized at Salida, Colorado High School, for giving senior students a small amount of occupational experience in field of their choice.

Beamer, Alan L., "Diversified Occupations in Covington H. S." *Industrial Arts and Vocational Education,* 29:98–100, March, 1940.
A description of the method utilized in initiating diversified occupation courses in a high school of a small community (Covington, Va.). The objectives of such a program; the advantages to the student, school, employer, and community; and the points to be observed by the co-ordinator are discussed. Examples of the daily work report, occupational experience report, employers rating sheet and co-ordinators report are included. A valuable reference in that techniques are presented which might be utilized on any level.

Bedell, Earl L., and Carpenter, Frank, "Co-operative Training in Automotive Maintenance." *Industrial Arts and Vocational Education,* 19:327–9, September, 1930.
The cooperative training plan which the Detroit board of education has evolved in conjunction with the Detroit Automobile Dealers Association is described. The student spends most of his first year at the cooperative high school and during his second and third years works in the cooperating service garages. A shop layout plan and synopsis of the course are interesting features of this article.

"Detroit's Training Program Grows" in *American Machinist,* 81:363–5, May 5, 1937.
Presentation of manner in which industries in Detroit area are formulating apprentice courses in order to provide a future supply of skilled workers. Mention is made of the cooperative plan carried on by the Wilbur Wright Vocational High School and the Cass Technical School. A worth-while reference in pointing out the numerous types of training programs in effect and the techniques of cooperation among various agencies in Detroit community.

Duval County Board of Public Instruction, "Cooperative Vocational Education." Jacksonville, Fla., 28 pp. mimeographed, 1939.

A description of the purposes, methods of initiation, administration, and co-ordination of a cooperative vocational training program carried on in the Jacksonville, Fla., public schools. The advantages, details of operation, program of training, and types of positions are described. Questions and answers concerning the program and testimonials from students, graduates, parents, and employers are interesting aspects of this publication.

Marshall, Robert C., "A Type of Cooperative Vocational Education, Jacksonville, Fla., 1934." Master's, 1935, Syracuse University, 88 pp.
Describes an experiment conducted in the high school of Jacksonville, Fla., where pupils in their junior and senior years of high school enter various training agencies cooperating with the schools, and secure training in the occupation of their choice under real conditions four hours a day for five days a week, for four full semesters of work. Students spend from one to two hours each day for five days a week in the vocational school studying the technical subjects directly related to the job and four hours each day, five days a week on the job.

"Three Diverse Plans for Providing Occupational Experience." *School Review*, 45:245–7, April, 1937.
An editorial describing techniques employed by Kingman High School (Peoria, Ill.) Nutley Junior High School (Nutley, N. J.) and Aberdeen High School (Aberdeen, S. Dak.) in providing occupational experiences for students.

Smith, Jr., Warren, "Diversified Occupations Program." *Teachers College Record*, 42:23–7, October, 1940.
Description of diversified occupations program as a form of part-time education involving cooperative working agreement between industries and schools. A typical schedule and characteristics of co-ordinators are outlined. From beginning in 1933 the D.O. program has spread until now there are more than 350 co-ordinators, working in nearly 300 different high schools training over 5000 boys for more than 100 occupations.

General

Benjamin, Roy A., "The South Blazes a New Trail for Youth." *Readers Digest*, 36:56–9, March, 1940.
Report of a project now functioning in 250 southern communities whereby students are given an opportunity to discover more about the world of work. The duties of the co-ordinator as contact man, instructor, and counselor are presented. The attitude of organized labor and businessmen toward the programs and the placement record on graduation are all stressed.

Everett, D. E., "Vocational Education for the Small Community." *Industrial Arts and Vocational Education*, 30:140, March, 1941.
Possibilities for making school program more vital and realistic through the use of a cooperative diversified occupations program are pointed out. Growth of these diversified occupations programs from beginning in 1934 to more than 600 in 1939 is stressed as evidence of such programs meeting a real need.

Herness, L. Clifford, "The Extent and Nature of Cooperative Part-Time Vocational Training in Public High School of the United States." Master's, 1936, University of North Dakota, 115 pp.
Finds that there are 29 public high schools in the United States giving part-time cooperative vocational training. Describes the part-time cooperative plan of industrial education, the present status of these schools, duties specific to the plan, course content, credits, selection of pupils for training, selection of place for training, special vocational guidance provisions, values of the plan, placement of pupils, and special agreements with the employers.

Kefauver, Grayson N., Noll, Victor H., Drake, C. Elwood, "The Horizontal Organization of Secondary Education." *National Survey of Secondary Education*, Monograph No. 2, U. S. Office of Education, Bulletin, 1932, No. 17, pp. 95–107.
An excellent statement of the advantages of cooperative curriculums, the enrollment and subjects offered, the procedures employed in assigning pupils, the rates of pay received by students and illustrations of cooperative programs. At the time this survey was made 167 schools reported that they had cooperative programs of training.

Metz, J. J., "Cooperative Part-Time Courses." *Industrial Arts and Vocational Education*, 27:149, April, 1938.
An editorial stressing several advantages of cooperative courses, i.e.: (1) as a method of bringing the students in contact with the world; (2) as a means of keeping courses up to date; and (3) as a means of assisting in permanent employment of students. The editor also stresses the need for careful selection of co-ordinators.

Graphic-Arts Occupations

R. RANDOLPH KARCH*

(Continued from page 387 of the November, 1942, issue)

Intermediate Positions

19. Bookbinder

Nature of the work — The making of bound books from printed sheets of paper delivered to the bindery in large sheets, with as many as 64 pages printed on each side of the paper. The sheets must be folded, sewn together, cased with covers, stamped in gold as to title and author, and other duties.

Working conditions — In a large plant, only several operations may be performed by the binder; in smaller shops, he may indeed be the only binder in the shop, and perforce must do all operations.

Personal qualities needed — The ability to work either alone, or with others in repetitive work.

Preparation needed — A bindery apprenticeship, augumented by school training.

Opportunity for advancement — Promotion to bindery boss or foreman.

Compensation — 80 cents to $1.20 per hour.

Advantages and disadvantages — Often repetitive work by hand or by machine.

20. Camera Operator

Nature of the work — The camera man in offset-lithography houses has charge of the making of negatives from which the offset printing plates are made.

Working conditions — The cameraman operates what is termed the darkroom camera, which in many cases is very large and capable of making negatives 6 ft. long. Some of his time is spent in the darkroom, developing the negatives.

Personal qualities needed — An artistic sense for light and shadows in photographs, and the ability to be confined in stuffy darkrooms which frequently are quite stuffy.

Preparation needed — An apprenticeship in photography and camera operation, or its equivalent in school training.

Opportunities for advancement — Promotion to platemaking foreman.

Compensation — From $40 to $75 per week.

Advantages and disadvantages — Confining work with chemicals.

21. Cylinder Pressman

Nature of the work — The pressman is the real printer, that is, the man who puts the ink on the paper from the type forms or from the engravings which print the pictures. The presses are the largest used in the industry, and are automatic in every respect.

Working conditions — Much of the pressman's time is spent in preparing the presses with the assistance of the pressman's helper. Working conditions are usually good, with air conditioning in many instances.

Personal qualities needed — The pressman must know how to mix colors to match the artist's sample or original. He must be enough of a mechanic to see that the presses are kept in good working order. He must work with others in complete agreement.

Preparation needed — An apprenticeship in a pressroom of sufficient size to enable him to operate most of the common presses on the market.

Opportunities for advancement — Promotion to pressroom foreman or plant superintendent.

*Principal, Printing High School, Cincinnati, Ohio.

Compensation — On small automatics, from $35 to $45 per week; on larger automatics, from $40 to $55 per week.

Advantages and disadvantages — Lifting of heavy forms into the press, often in rooms kept quite hot.

22. Estimator

Nature of the work — The estimator is one who has the responsibility of figuring out the probable cost of doing a job of printing or lithography. From cost and time standards and local plant records, he decides that a given job will cost the customer a certain amount of money, so that the plant will make a profit on each job done. He deals constantly with figures.

Working conditions — Work is done in an office, with charts and books.

Personal qualities needed — Complete mastery of simple arithmetical calculation, and the ability to pick up hard-to-compute answers as to costs.

Preparation needed — A thorough knowledge of the plant's operations, and a reasonably good general education.

Opportunities for advancement — Promotion to office manager, or owner-operator.

Compensation — From $40 to $60 per week.

Advantages and disadvantages — Office work, usually at a desk for the working day, dealing with figures, charts, costs, etc.

23. Hand Compositor

Nature of the work — The hand compositor may merely follow and interpret the design and layout of the layout man or typographer in the work that he composes in type and ornament, or he may both design, lay out, and compose the work himself.

Working conditions — Usually good, in well-lighted and clean composing rooms.

Personal qualities needed — The ability to work from other's specifications. In some cases, when layouts are made by the hand compositor, an artistic sense is necessary.

Preparation needed — An apprenticeship in a composing room, or the school equivalent thereof.

Opportunities for advancement — Promotion to layout man, shop foreman, or superintendent.

Compensation — $40 to $60 per week.

Advantages and disadvantages — Inside work with little opportunity to sit down.

24. Layout Man or Typographer

Nature of the work — The layout man designs the advertising and other commercial work which the hand and machine compositors set in type. His created design is sent to the compositor with all measurements and sizes and kinds of type marked in detail.

Working conditions — Work is done usually at a drawing board, similar to that used in mechanical drawing. The usual artist's tools are also added, so that a customer can visualize the finished job while it is still in the formative stage.

Personal qualities needed — The ability to do a sedentary job, within doors. A definite talent for the artistic is prerequisite.

Preparation needed — A good background in type composition and modern typographic and art principles.

Opportunities for Advancement — Promotion to composing-room foreman, superintendent. Transfer to other fields as type designer, typographic consultant, artist.

Compensation — From $40 to $75 per week.

Advantages and disadvantages — Inside work on the most part, with most of the time spent sitting and working.

25. Layout Man in Lithography

(See Layout Man.)

26. Offset Platemaker

Nature of the job — The offset platemaker uses the negatives made by the cameraman, and transfers the image to thin metal plates, which are used on the offset press to make the impressions of ink on the paper.

Working conditions — Arc lights, whirling tables for coating plates are a part of the platemakers' tools. He works continually with certain chemicals in what appears to be a laboratory.

Personal qualities needed — The platemaker needs to be one who is satisfied to work with the smells of chemicals, and in doing painstaking work.

Preparation needed — An apprenticeship in a lithographic platemaking shop, or its school equivalent.

Compensation — From $40 to $75 per week.

Advantages and disadvantages — Working in what is not always fresh air, and while on the feet most of the day.

27. Linotype Machinist

Nature of the work. — The linotype machine is one which, through the action of the circulating matrix, allows lines of type to be cast, which eliminates the setting of type by hand. The machines are very complicated and intricate, and where many are used in one printing firm a special machinist is hired to keep them in repair and in good operating order. The linotype machinist does not manufacture parts, like the usual machinist, but adjusts and places new parts on the machines in his care. He is aided by the machinists' helper.

Working conditions — The machinists' work is greasy, but most fascinating.

Personal qualities needed — The machinist must have a liking for machinery, and the ability to tune it up to run at its best.

Preparation needed — An apprenticeship to a linotype machinist, or its school equal.

Opportunities for advancement — Machinist-in-charge of a large battery of machines, and equipment salesman, or erector.

Compensation — Practically the same as that of the operator, $40 to $55 per week.

Advantages and disadvantages — Greasy work with machinery, along with great responsibility to keep the machines in order at all times.

28. Linotype Operator

Nature of the work — The term linotype is used here because of its recognition by the public at large. Actually, one can be the operator of not only Linotypes, but Intertypes and Linographs. These three machines are virtually the same in their operation, however. The operator manipulates the keys of the machine, which cause small matrices to fall into line, and from which the type line is finally cast automatically.

Working conditions — In large shops, the linotype operator will merely operate the keyboard, reading from his copy. In a smaller shop, where his may be the only machine, he must act not only as operator but machinist as well.

Personal qualities needed — The operator must be able to read quickly, and be able to sit throughout the day at the machine.

Preparation needed — The linotype operator should have a hand composition background, and be able to quickly and correctly adapt the office style for punctuation, word division, and spelling. He often is a hand compositor who has learned the operation of the machine in a school.

Opportunities for advancement — He may become foreman of the linotype department, composing-room superintendent, or plant manager.

Compensation — From $40 to $55 per week.

Advantages and disadvantages — One must sit continually while at work, and read constantly. In large shops, where one only operates and does not take care of the machine, the work is as clean as office work.

29. Lithographic Pressman

Nature of the work — The work of the lithographic pressman differs greatly from that of the letterpressman. The processes are quite dissimilar. Work done by letterpress is from raised surfaces; that done from lithographic plates is from a plane surface, with the use of both water and ink to provide the correct laying on of ink to the paper or material being printed.

Working conditions — The work seems the same to the layman as that of the pressman in letterpress printing. Greater care must be taken, however, in offset lithography, and more vigilance is required.

Personal qualities needed — Extreme patience is required, and the ability to measure and test the solutions used. Color blindness would eliminate one from any pressroom job where color work is done.

Preparation needed — An apprenticeship in a lithographic pressroom, or the equivalent in school shops.

Opportunities for advancement — Promotion to pressroom foreman, or plant superintendent.

Compensation — $40 to $60 per week.

Advantages and disadvantages — Great attention and concentration is required on the job, which is, of course, inside work, and therefore found confining by some.

30. Make-Up Man

Nature of the work — The make-up man works on weekly or daily newspapers, and his work constitutes the assembling of news and advertising matter for each page of the paper.

Working conditions — Fast and accurate work is a prerequisite for the job. Just before

press time, the pressure is great, and speed essential.

Personal qualities needed — The make-up man is always on his feet, working over the steel *turtles* and handling the type matter and ads skillfully and quickly.

Preparation needed — An apprenticeship in a newspaper composing room.

Opportunities for advancement. — The make-up man may take over complete charge of the make-up department, and may, in some cases, become the composing-room foreman, later being advanced to mechanical superintendent.

Compensation — The same as that for the ad compositor, or from $45 to $55 per week.

Advantages and disadvantages — Make-up men are often regarded as specialists who know little other than the make-up of newspaper pages, which may result in a layoff should papers merge. There is believed to be little transfer of training to other occupations in the field.

31. Monotype Caster Operator

Nature of the work — The monotype machine is one which casts type matter in single units, that is, letter by letter. The controlling ribbon is made by the monotype keyboard operator, and the caster operator places it in his caster. The ribbon actuates the position of a matrix case containing 225 characters of type, and a selection is made automatically as to which of these characters will be cast at the rate of 150 per minute.

Working conditions — The machines are relatively difficult to adjust, but high precision (to 0.0001 in.) is necessary. The machines are complicated, and contain a metal pot with fluid type metal often at a temperature of 800 deg. F.

Personal qualities needed — The ability to make careful adjustments and to keep intricate machines in good order. The job may be likened in part to that of the linotype machinist, although they are quite different trades.

Preparation needed — An apprenticeship to a monotype caster, or the equivalent in a school, such as is maintained by the manufacturers of the monotype.

Opportunities for advancement — Promotion to caster-room foreman in a large plant, combination keyboard and caster operation, or composing-room foreman.

Compensation — Usually slightly over scale if a combination job is worked. From $40 to $55 per week.

Advantages and disadvantages — The work is quite hot in the summer months, and requires meticulous care of the intricate machine. One must stand while at work.

32. Monotype Keyboard Operation

Nature of the work — The monotype keyboard is operated by compressed air, and contains several banks of keys which are of the general order of those on a typewriter. Instead of typing, however, the machine punches small holes in a paper ribbon, which, as mentioned, operates the monotype caster.

Working conditions — The keyboard operator sits at his machine, and operates the keys, following the copy to be put into type. The work is clean, and many women are employed in this work.

Personal qualities needed — One must be so constituted that he can be confined to his keyboard all day, tapping out the copy for the printed matter.

Preparation needed — An apprenticeship in a monotype keyboard room, or special training in school for work on the keyboard. Some mathematics are needed, especially where work is of a general nature, rather than just plain column type matter.

Opportunities for advancement — Promotion to man in charge of the monotype room; combination keyboard and caster operator, or composing-room foreman.

Compensation — From $40 to $55 per week.

Advantages and disadvantages — One must sit continually while at work, and read copy all day while operating the keyboard.

33. Proofreader

Nature of the work — The proofreader not only scans the first print of newly set type matter, but also looks for errors which may have occurred in the original copy — or mistakes made by the writer or author. He or she is aided by the copyholder, who reads aloud from the copy, while the proofreader closely examines the proof for deviations from the copy. In this way the errors made by the linotype and monotype operators are found and corrected before the job is printed.

Working conditions — Conditions are usually good in the larger establishments, but often poor and noisy in the smaller plants.

Personal qualities needed — The reader surveys the proof not for its value as to content, or to get the sense out of it, but primarily for the finding of errors. Relatively few people take interest in such work.

Preparation needed — The proofreader should have a good general education, especially in English grammar, spelling, word division, history, and geography.

Opportunities for advancement — Promotion to head proofreader.

Compensation — In newspaper work, from $40 to $55 per week. In other types of plants, depending upon the work done, from $30 to $75.

Advantages and disadvantages — The proofreader must read all day, which may be tiring to the individual's eyes. The work is physically inactive.

34. Rotary Pressman

Nature of the work — Rotary presses turn out, at great speeds, our newspapers and circulars, magazines and journals. Rotary-press production is used where runs total into the millions. The presses are unlike those operated by the platen and cylinder pressmen in that they print from cylindrical plates rather than from type forms which are flat. Rotary presses often are two stories high, and a block long, and require many pressmen to operate them.

Working conditions — The rotary pressman must climb up and into the press, and set the web of paper in motion which feeds from an enormous roll weighing hundreds of pounds. He places the plates in their correct position, adjusts the rollers, controls the ink, and sees that the machine is in good working order.

Personal qualities needed — He must be able to lift and place the heavy stereotype and electrotype cylinders and semicylinders, and learn the operation of each part of the mammoth machine.

Preparation needed — An apprenticeship in a rotary pressroom. Few schools prepare one for such work.

Opportunities for advancement — Promotion to foreman of the pressroom.

Compensation — National average show a 39-hour work week, at $1.174 per hour. In Cincinnati the scale is $1.24 per hour for 40 hours. Where color printing is done, the rate of pay is much higher than this.

Advantages and disadvantages — The work is often dirty, and also requires great attention to duties and to the press.

35. Stone and Imposition Man

Nature of the work — After the hand compositer assembles type matter into pages, or composes a simple job such as a letterhead, the type matter must be *locked up* for the press. In the case of books, where as many as 32 and 64 pages are printed on one side of the sheet at one passage through the press, the pages must be placed in a certain order, so that when folded according to plan, they come out as a book. This work is done by the stoneman.

Working conditions — The stoneman stands all day at the imposing tables in the composing room, locking and unlocking forms as they go to and come from the presses.

Personal qualities needed — The stoneman must be capable of taking orders and reading directions, and be able to get along with the compositors whose work he handles.

Preparation needed — An apprenticeship in the composing room, with added training in his duties.

Opportunities for advancement — Promotion to composing-room foreman.

Compensation — The same as that for the hand compositor — from $40 to $55 per week.

Advantages and disadvantages — He must often correct the mistakes made by others; must stand all day; and he must lift heavy forms from the floor to the imposing tables.

36. Teletypesetter Operator

Nature of the work — The Teletypesetter machine consists of two units; one is similar in size and operation to a typewriter which punches a series of holes in a small ribbon. The keyboard machine is usually operated by a girl. A Linotype or Intertype machine is outfitted with a special device which is fastened to the keyboard in such a manner that the ribbon controls the manipulation of the keys. The teletypesetter operator services the keyboard, but does not operate it. He sees that the unit affixed to the linotype works in good order, and services the linotype itself as a machinist. This work must not be confused with that of the monotype keyboard and caster operator.

Working conditions — The type of work is very similar to that of the linotype machinist; that is, keeping the intricate teletypesetter units in repair as well as the machines which set the type.

Personal qualities needed — Painstaking care must be taken with details of the work involved.

Preparation needed — One must first be a machinist-operator on linotype machines, and take a special course to know how to operate the teletypesetter.

Opportunities for advancement — Promotion to composing-room foreman.

Compensation — Slightly above the wages paid to the machinist and operator, from $40 to $55 per week.

Advantages and disadvantages — Such specialists are in demand, and seldom are laid off. *Time* magazine is composed in several places at the same time through the use of teletypesetters.

Professional Positions

37, 38, 40, 42. Foremen of the composing room, pressroom, platemaking rooms, and bindery

Nature of the work — These professional positions have been collected under one heading because although the work differs greatly, it is quite similar to the work of the journeymen listed in the intermediate positions. Foremanship assumes several prerequisites: the foreman must have a greater degree of knowledge than the men who work under him; he analyzes work and organizes his men to perform the tasks necessary; he acts in a supervisory capacity; he sees that economy is maintained; instructs his men in certain duties; and keeps the department operating in the proper manner.

Working conditions — The foreman of any department must adapt his men and machines for best production, and check often to see that progress is made on the work in the plant.

Personal qualities needed — The foreman should be a leader of his men, and command their respect. This makes a mastery of his work a prime necessity. He must be able to do anything that his men can do, and probably do it better.

Preparation needed — Years of experience in the work being supervised are required, as well as the ability to accept new processes and methods, and to keep up with all technological changes in the graphic-arts industries.

Opportunities for advancement — Promotion to plant superintendent.

Compensation — Salary is usually open to such men who can qualify. Pay is commensurate with ability. In small shops, the pay may be a few dollars above the journeymen's wage. In the larger shops, the pay might well run up to $100 per week.

Advantages and disadvantages — The success of the entire department rests in the hands of the foreman, who carries the responsibility for the work that is being performed.

39. Layout Counselor

Nature of the work — The layout counselor is usually a freelance worker who is employed either part time or now and then by printing plants when they have certain high-class work to be done. (See Layout man and Typographer.)

41. Owner-Operator

Nature of the work — The owner-operator is usually one who has become proficient as a plant superintendent or foreman, and who has established his own shop. If his plant is small, he may do most of the work himself; if large, he may hire others to take some of the responsibility from his shoulders. In either event, he must strive to make a success of the mechanical end of the shop.

43. Printing Engineer

Nature of the work — The printing engineer is one who has set up an office as consultant for printing and lithographing plant owners. His job is to help them to apply modern engineering principles to their work. He acts in an advisory capacity, or may take over the management of a plant for the length of time necessary to bring about the suggested changes.

Working conditions — The engineer will probably travel to allow him to be of best service to his clients.

Personal qualities needed — He will probably be cognizant of the mechanical and business management of all types of printing and lithographic plants.

Preparation needed — One who is in this work is probably a graduate mechanical engineer, with a good part of his time spent in studying graphic-arts industries of all kinds.

Compensation — He is employed by printers for varying fees according to the services rendered. A successful engineer would be one of the highest paid in the industry.

Advantages and disadvantages — Travel, intense work over a period of time followed by some inactivity.

44. Printing and Lithographing Salesman

Nature of the work — The salesman investigates the advertising needs of his clients, and plans and suggests certain printed matter for the sale of goods. Then he brings to his shop the necessary orders to keep the firm in business.

Working conditions — The salesman must know the principles of advertising and sales psychology, and he should be acquainted with many influential people. He must also know printing and lithography, and how it can be used to best advantage.

Personal qualities needed — The salesman must be neat, well dressed, courteous, and an intelligent talker. He must, above all, be able to sell.

Preparation needed — Very often the printing salesman was at one time working in a plant in one or more capacities. He needs to know all of the reproduction processes, and how to select the one best for a given job. He should be well trained in salesmanship.

Opportunities for Advancement — Promotion to sales manager. The salesman may in some cases open his own plant, and become an owner-operator.

Compensation — $25 to $100 per week.

Advantages and disadvantages — Very often the salesman works on the commission basis alone, which makes him very vulnerable during times of depression. He must call upon, and perhaps entertain, customers at all times of the day and often at night.

46. Typographer

Nature of the work — The typographer is a leading layout counselor or layout man. He may either head up the work in a large advertising agency, printing or lithographic plant. See Layout Counselor and Layout Man for other information.

Allied Positions

47. Artist — Designer

Nature of the work — The artist-designer is a commercial artist, specializing usually in the planning of advertisements, brochures, books and pieces of mail advertising.

Working conditions — He works either on call or as a steady employee of a printing plant.

Personal qualities needed — He must be ready at all times to illustrate and hand letter designs and headings for varying pieces of work.

Preparation needed — He is probably a graduate of a commercial art school or department.

Opportunities for advancement — Owner of his own agency.

Compensation — He charges on a fees basis for work done, or accepts a salary from a printing plant where he may be employed steadily.

Advantages and disadvantages — during times of depression there is little call for his talents.

48. Business Manager

Nature of the job — The business manager acts as overseer of the estimating, billing, and often the sales department of the printing establishment.

Working conditions — He looks up the credit of customers, and checks the work of all the workers in the *front office*.

Personal qualities needed — He needs to know office procedure, and have good business sense.

Preparation needed — He should know enough about the reproduction processes to supervise the work of those in his office.

Opportunities for advancement — He may become one of the controlling members of the corporation, or go into business for himself.

Compensation — From $50 to $100 per week.

Advantages and disadvantages — Often confining work, with a great amount of personal responsibility.

49 and 61. Equipment and Supply

Nature of the work — The equipment salesman calls upon the printing and lithographing trade for the purpose of selling one or more of the many pieces of machinery in use: presses, linotypes, type, cabinets, etc. The supply salesman sells ink, paper, and other such items necessary for production.

Working conditions — The salesman usually has a given territory to cover, which may be in one city, or far flung over several states.

Personal qualities needed — The salesman must be pleasant, and have a thorough knowl-

edge of the product, which he must be able to sell.

Preparation needed — A thorough knowledge of the field that he represents, and sales experience.

Opportunities for advancement — Promotion to sales manager.

Compensation — The salesman of equipment or supplies usually has a drawing account as well as commissions on sales. Many make from $75 to $150 per week.

Advantages and disadvantages — If on a commission basis of pay, the depressions make great inroads on the salesman's pay. Many must travel a great part of the time, not getting home for weeks.

50. Electrotyper

Nature of the work — The electrotyper is one who manufactures the duplicate plates known as electrotypes. These plates are sold directly either to the printers or to those who have printing done. The printer sets the type, which is locked up and sent to the electrotyper with orders to make one or many facsimile copies of it. The electrotyper's trade is totally foreign to that of the printer, and there is no transfer of training from one occupation to the other.

45 and 51. Production and Executive Superintendent

Nature of the work — The production superintendent, and the executive superintendent are directly over the department foremen in the printing and lithographic plants. Their jobs are to co-ordinate and correlate each department with the others. Much responsibility rests on their shoulders, and their compensation often runs as high as $250 per week.

52. Graphic-Arts Teacher

Nature of the work — The graphic-arts teacher is usually one who teaches printing and allied subjects in a high school.

Working conditions — Teachers spend about six hours per day in teaching, and the better ones spend from one to two hours in addition to this preparing work, grading papers, and keeping their shops in good order.

Personal qualities needed — Teachers must like to work with boys and girls, and not become nervous in confusion and noise.

Preparation needed — For teaching in regular high schools, teachers must have been graduated from teacher-training colleges or universities. For admittance to some school systems as vocational teachers, they must have served seven years in a trade of the graphic arts, and be willing to take courses in education while they teach.

Opportunities for advancement — Promotion to schools where the pay is greater; promotion to vice-principal and principal.

Compensation — From $1,800 to $4,400 for a year of about ten months.

Advantages and disadvantages — Relatively short hours, a two-month layoff in the summer months; the freshening contact with youth. In school shops operated on the production basis, it is often difficult to turn out the work wanted with children doing the tasks.

53 and 54. Gravure Platemaker and Pressman

Nature of the work — The gravure process is also known as intaglio. In this method of printing, which is totally different from lithography and letterpress, the image is etched into the surface of the plate, the whole then inked, whereupon the surface is scraped clean so that ink remains only in the etched-out portions of the plate. Upon impression with the paper, the ink leaves the cells and adheres to the stock, making the print. As there are fewer than 50 gravure plants in the United States, this mention will suffice.

55. Office Manager

(See Business Manager.)

56. Photoengraver

Nature of the work — The photoengraver supplies the letterpress printer with *cuts* or line and half-tone engravings so that pictures can be provided for printing matter. Photoengravings are not used in any other process. Some large plants have their own engraving departments, especially newspaper establishments. The photomechanical processes are responsible for the splendid color reproductions and illustrations found in our weekly magazines, such as the *Saturday Evening Post* and *Life*. There is little if any transfer of training in this supply business for the printer, as the work is uncommon to the printer's duties.

Working conditions — Generally of the best.

Personal qualities needed — Attention to minute detail.

Preparation needed — Apprenticeship in an engraving firm, which is very difficult to get.

Opportunities for advancement — Foreman, or owner-operator.

Compensation — Probably the highest paid in the graphic arts: national average is $1.451 per hour; Cincinnati scale is $1.60 per hour for a 37½-hour week.

Advantages and disadvantages — Census figures show that the trend in employment is down.

57. Photographer*

Nature of the work — Photographers are employed in newspaper plants to take the news pictures we see daily, and in advertising agencies for making black-and-white and color photographs of advertised products.

Working conditions — Usually excellent.

Personal qualities needed — An artistic sense, or a nose for news values.

Preparation needed — A thorough background in photography — probably specialized training in the shop or at a school for photography.

Opportunities for advancement — Picture editor on newspapers; owner-operator of one's own studio.

Compensation — $40 to $100 per week.

Advantages and disadvantages — Work out of doors in any weather; studio work of a confining type.

58. Printing Journal Writer

Nature of the work — Assisting the editors of our 55 American journals devoted to the publicizing of articles and news in matters pertaining to all phases of the graphic arts is the job of the printing journal writer. These workers are few. Most of them must have a good background and understanding of the material they write about.

59. Reporter-Editor

Nature of the work — The thousands of weekly newspapers and small dailies over the country employ many young men and women as reporters and as special editors. Although usually foreign to the production department of the newspaper, very often these people spend some of their time getting out the paper and in the shop itself.

60. Rubber Platemakers

Nature of the work — Rubber platemakers are of two types: those who cut designs by hand directly on the rubber itself, which is used as a printing plate on letterpress machines, and those who use both plastics and raw rubber in vulcanizing the plates from matrices pressed from the type or illustrative forms themselves. This is a new occupation, about which little is known, as it is not yet standardized.

62. Type Founder

Nature of the work — A little known and very small occupation is that of the type founder. Using common type-making machines, such as the Monotype, and the Thompson Typecaster, he makes type which is sold to printers for hand composition out of type cases. This is very specialized work, and few are so employed.

63. Silk-Screen Printer

Nature of the work — The silk-screen process of printing is a rising occupation. It is totally foreign to any other graphic-arts process. The design may be placed on a silk screen by hand or by photographic methods. Paint is then forced through the screen with the use of a rubber squeegee onto the paper, wallboard, glass, cloth, or object selected. It is a stenciling process which will print on almost any material or object, flat, round, or curved. Data is lacking on this occupation.

64. Copperplate Printer

Nature of the work — Deluxe stationery, which can be noted for its intense blackness and tendency to stand away from the paper, is produced by the copper or steel plate printer by the intaglio method. It is usually a hand operation, although many plants have automatic machines for printing. The design is either hand or machine etched in the metal, the surface of which is entirely inked as in gravure, then wiped off. The impression against the paper brings the ink out of the etched lines and designs. Our paper currency is produced in this way. These shops are relatively few, there being only 437 in the entire United States, according to the last census figures.

65. Inkmaker

Nature of the job — Printing-ink manufacture is primarily the work of the ink chemist. However, many pressmen from all fields of

*High s

the graphic arts are employed to aid the ink manufacturer by acting as trouble shooters, whose duty it is to visit the plants where the ink is made and clear up any difficulties found in the product. Compared with other occupations, this work is very small.

Number of Establishments

Printing and Publishing and Allied Industries
Cincinnati Industrial Area
(Those doing less than $5,000 in business annually omitted)

Area	*Establishments*	*Employees*
Newspapers: publishing without printing.....	4	44
Newspapers: publishing and printing.....	12	1967
Periodicals: publishing without printing.....	27	306
Periodicals: publishing and printing.....	10	829
Books: publishing without printing.....	3	165
Books: publishing and printing	2	165
Books: printing without publishing	12	316
General commercial job printing	130	2379
Lithographing and photolithographing	17	1047
Greeting cards.....	2	900*
Bookbinding and related industries	18	324
Machine and hand typesetting	8	150
Engraving, steel, copperplate, and wood.....	5	38
Photoengraving not done in printing establishments	13	211
Electrotyping and stereotyping	4	299
	267	9340

*Estimated, conservatively.

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Dressing Up the Model Airplane Program

ROBERT E. OWEN*

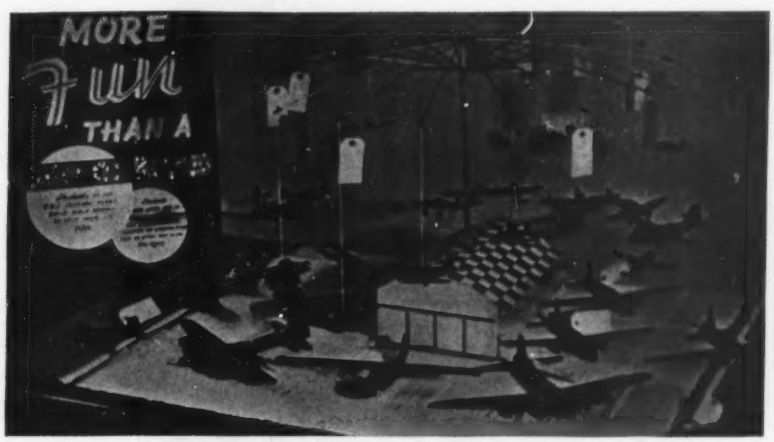
Any new program, such as model airplane building, offers a wealth of progressive teaching. Yet, it is a perplexing problem to break up the routine program of a scheduled semester's work in the school shop. The request of the Navy Department for a half million scale model airplanes to be built largely by the school-shop boys came without previous warning. Most shop instructors had difficulty deciding whether to scrap the present semester's program for full-time model production in the shop or to organize clubs so that classwork would not be disturbed. Moreover, such an immense program could not be taken lightly by the educational system of America. There was no time to be wasted in deciding upon which course to take as its importance demanded immediate action.

The problems that were bound to arise could only be solved as they appeared. The greatest immediate problem was solved by shelving the current unfinished projects upon which the students were working.

In the Romeo High School, where a hundred boys are enrolled in woodwork, a model airplane club was immediately organized. Various duties to be met were discussed and officers were elected to fit each type of responsibility. The club was organized on the lines of a war factory with officers assigned as foremen and executives. Thus, those officers with previous model plane building experience formed the nucleus of the plant and were invaluable in assisting the shop instructors.

The officers, as a group, cut templates from the government plans and rated models as to their difficulty of construction. As a result of this rating system, more experienced boys built the more difficult models. Boys who appeared to have little ability or confidence in building precision scale models were given other assignments. A few were *stock chasers* who cut wood to rough specifications. Some took charge of tools and supplies, while others made jigs and fixtures and replaced worn templates and gauges.

Before actual plane construction began, the atmosphere of the program was prepared by altering the appearance of the shop to resemble a factory. Airplane pictures from magazines and current aviation articles from newspapers were brought in by the students and hung on bulletin boards in the shop. Cards designating the shop as a war plant were fastened in the windows. The shop entrance doors were



A novel airplane display

*High School, Romeo, Mich.

covered with colored pictures of airplanes so that anyone passing through the hall could not see the students working. Signs outside the doors were lettered "R.H.S. War Plant." A few nonflying balsa models made by a student were brought in and suspended from the ceiling. Badges were made for each student with R.H.S. War Plant printed on them.

When everything was ready to begin production, the operations on the large wall charts, with drawings and technical aeronautical terms, were explained. Demonstrations were then given of initial layout and working steps. As the students' work progressed, other operations contained in the charts were found to need further explanation.

Mass production and other stereotyped methods were not attempted in the program at Romeo. Whereas such methods of production are best for adult workers, they are not suited for boys, who view war largely with heightened imaginations. Mass production destroys imagination in the mind of anyone who participates in it. A boy likes to carry through his own project from beginning to end. And he must do just that to maintain interest in such a lengthy program. Then, too, more learning operations and tools may be used and mastered if the student is permitted to carry out the construction of his entire plane. The model plane program in the R.H.S. War Plant was not conducted by mass production methods, and in contrast to mass production methods observed in other schools, ran smoother in general. The result was almost double the assigned quota.

As soon as the first models were completed, a store window display was arranged. This display served a twofold purpose: to encourage students to produce in the needed quantity and quality, and to convince the public how high school students can actively contribute to the war effort. It also did no harm as a booster of public morale. The display consisted of an old umbrella frame mounted upon a hanger which was made of cardboard. Models suspended by strings were revolved slowly with a geared down motor. A sign in the background contained a brief explanation of the program. This was followed by more information which appeared as news and feature articles in the local newspaper from time to time. The display was viewed by the public with enthusiasm.

Interest was sustained in the middle of the program by having Captain Caldwell, of the United States Army Air Corps from nearby Selfridge Field, speak to the model builders. The captain informally discussed the need of scale model planes and related some of his experiences as a pilot.

At times during the program the identifying features and the parts of a plane were studied and discussed. This provided a relief from the close work involved in building the scale models.

Before the program was ended, the superintendent of schools invited the model club president to attend a meeting of the local Rotary Club. There he displayed his models and discussed them with the Rotarians. The fine workmanship on his models moved the club to donate prizes in war stamps to the boys making the best efforts in the program.

Besides helping to win the war, such a program, from an educational standpoint, is invaluable in the high school shop. Our future craftsmen have learned many operations and have also gained a great deal of information in the high school shop that they will carry over with them to the vital production lines.

Arts and Crafts in Modern Living

HAROLD H. KIRK*

As the war efforts become more critical, we are given cause to wonder more and more what the future may hold for the youngsters now in our classes. Defense programs are crowding upon us and provoking us into re-examining and reanalyzing pedagogy and shop content. These critical times, with millions untrained in the crafts, make us wonder if we are doing an adequate job in guiding and training our youngsters in the graphic arts. Most of us are parents as well as teachers. Are we satisfied, as parents, with the training our son is getting or will get in the school shop in our particular community?

In 1935, when the national honor club for graphic-arts classes was organized, there was a definite feeling expressed that our shops were not doing, as a whole, an adequate job of content enrichment, pupil guidance, and orientation. In fact at the Chicago printing conference, one of the leading editors inferred that our apprentice program did not compare with that of England. He was right! They have been years ahead of us in craft instruction.

For the most part, the practice in this country in our school shops has been the old manual training concept of teaching specific skills and operations about a single phase of a trade, quite frequently on a power machine. The scope was limited and the emphasis was upon the manual side only. For the most part the activity was teacher directed rather than pupil centered. The content was planned with little or no thought to the individual or his needs. As has been so pointedly expressed, the instructor worked on the boy to get out the school *production,* the scenery for the senior play or the forms for the front office.

There was little thought of working with the boy in developing *his* individual talents and inclinations. Natural interest was lacking. Cooperation was forced. Today, club sponsors who are developing a diversified activity program in their work are realizing the contrast by new interest and spontaneous cooperation of the boys.

Craft Consciousness Needed

From the writings of William Morris, wood carver, designer of fine furniture, printer and binder, one can learn of that period in England called the *Arts and Crafts Movement,* that movement which did much to restore the appreciation for good craftsmanship, good handicraft, and later good practices in the English schools.

We, too, must become aware of our needs as the English in the 1890's. In fact, it took England a hundred years to do something about the arts and craft lag. Shall we wait that long? Some teachers in the United States are becoming cognizant of a need for action in the reviving and the serious teaching of the handicrafts on all levels.

From the earliest days in school we are taught the history of past civilizations — how they lived and fought with one another, but hardly a word is said about what their trades or crafts may have been. If we can judge by present practices, the historians of the past emphasized the wrong things; those things which have little or no use to us today.

To some degree the traditions of the arts and crafts has persisted down to us, however, in spite of our classical culture and the educational training system perpetuating it. We are just beginning to explain our craft heritage to the boys in our shops and laboratories. The history of past peoples has been stressed, but little has been done to keep alive the skills of the fine arts and crafts of the same age. The result is that many of these fine old crafts have already disappeared or are fast disappearing.

Today our eyes are becoming used to fine paper, choice inks, rare alloys and plastics, clever veneers, and unique uses of these modern materials. Machine techniques improve in a specialized sense, but the arts

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and crafts are just beginning to come into their own in modern education.

Craft Definition and Exploration

By way of definition, one may say that *art* is an attempt to achieve beauty, to interpret life, and to express emotions through images and materials. Further, it is the skillful and systematic arrangement or adaptation of means for the attainment of some end. But more specifically, the arts and crafts are to combine for the sake of utility, as contrasted by the fine arts which aim at aesthetic beauty alone. Briefly, it is the creative use of our hands for artistic expression of ourselves.

If we were to look into a crystal globe today, I think we would see revealed four enemies to our present-day craft training. These modern four horsemen would be the power machine, speed, piecework, and mass production. No one workman has time to develop the feel of a craft for he is just an impersonal cog speeding up mass production. I feel the youngsters must be taught to feel the whole of a piece of work. Our shops must teach the handicrafts, for industry hasn't the time nor the interest. Then too, the individual should be taught that what he is doing is useful and creative.

Probably educators can't remove political and industrial bottlenecks any better than can the politicians. But there is no excuse for not trying to replace narrow bottlenecks in educational practice with adequate bridges and highways.

Our country is at present fighting to preserve the things for which we have fought before — political freedom, intellectual freedom, religious freedom, and social freedom. But, isn't this all rather in vain if the individual has never been trained to use his creative power, his hands in building his place in this democracy?

To preserve this precious freedom, we must work with our hands, we must be a part of that which we make, so that we will be ready to meet our country's needs in industry or in uniform. A nation of untrained and unskilled men cannot preserve and keep the things we hold so dearly. Growth and maturity must come from the hearts and hands of individual craftsmen. We must do more than believe in democracy. We must, with our crafts, our trade, our hobbies, and our whole lives, make it live.

Summary

In order to provide exploratory experiences in the handicrafts, the school must create situations which will carry craft habits and desires beyond the shop. Some of this may be done in the following manner:

By providing adequate units in a diversified program so that the individual may be able to use his hands in many areas and in many crafts, if and when the occasion may arise.

By keeping alive the history and development of craft heritages so that the individual may learn, preserve, and profit by past craftsmanship.

By exchanging experiences between schools so that the individual may compare his crafts workmanship with that of others.

By providing sufficient knowledge and skills so that the individual is capable of understanding his environment; and so that his craft experiences are wide and full enough that he may participate more fully in business, industry, and in his civic life.

Industrial Training in the Present Emergency*

VERNON H. OLSON**

Education, no less than soldiers and workmen — no less than industry and commerce — must play a part if we are to win this war.

Industry must pay tribute to the industrial teachers representing those schools that have put on war production training programs. Many courses are operating 24 hours a day, and all told, there are more than a million students now taking war production training. This indicates that industrial teachers are fully aware of their obligation and are doing their utmost in this emergency.

It is their job to train workers quickly, correctly, and conscientiously. This means streamlined training, which precludes long expositions on theory or the reading of involved textbooks on the part of the student. Teachers must summarize the field of knowledge and the basic educational points so that overnight courses may be inaugurated.

To get a real picture of what must be accomplished we must consider that: to keep one airplane flying eight men must be trained to service and repair it. A battleship cannot be put to sea without electricians, carpenters, cooks, pharmacists, and radio operators, and men trained in 40 other vocations.

But this is only one side of the picture. The war effort today involves one man at the front, seven in ordnance and in the machine shop behind the front, and 11 men in industry back home to keep the lathes humming.

In 1942 our war work will increase so that we will jump from 5,000,000 to 18,000,000 workers. In 1943 instead of 18,000,000 there will be 25,000,000 in war industry.

In the same ratio, our civil life pursuits will drop from 44,000,000 in 1941 to 23,000,000 in 1943. The auto mechanic, the bond salesman, and the lathe hand in the refrigerator plant largely will have moved into war industry.

This should cause our jobless to drop from 4,000,000 in 1941 to around 1,000,000 in 1943.

Our men in uniform will climb from 2,000,000 in 1941 to 5,000,000 in 1942 and perhaps to 10,000,000 in 1943.

Our working force in the nation will increase from 55,000,000 to 59,000,000 by 1943. Youths graduating from high school will be a part of this figure. Women likewise, in increasing numbers will contribute to the war effort.

A great part of the training job which will follow must be done by the schools. As a result pre-employment short courses must be conducted, giving instruction in specific skills such as welding and riveting.

Supplementary courses must be given which will aid workers to improve their skills. Skill for which training is being provided must include blueprint reading, lathe work, milling, chipping and filing, welding, the operation of the Doall Contour machine, and general all-around machine-shop practice.

For the time being the schools must change their emphasis from the general courses to those of an industrial nature. They must see to it that men are trained so that they can do their utmost to assist our country in winning this war, and thus preserve our liberty and the American way of life.

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*Résumé of address presented before the Industrial Education Division of the Progressive Education Association Convention, Stevens Hotel, Chicago, Feb. 21, 1942.

**Purchasing Agent, Production Manager, Personnel Manager, and Assistant Secretary, Contour Saws, Inc., Des Plaines, Ill.; also War Production Board Trainer for supervisors in Defense Industries through the Illinois Institute of Technology; and Chairman of Metal Saw Committee of the War Production Board.

Problems and Projects

MOLDING PLASTICS IN HIGH SCHOOL

DALE PETERSON

Formerly Teacher of Woodwork and Hobbies
Irving High School
Salt Lake City, Utah
Now in the U. S. Army

(*Continued from page 26A of the November, 1942, issue*)

The Press

Plastic articles can be molded in almost any type of press. The most important quality of the press is that it be able to exert a pressure of 2000 pounds upon each square inch of the article being molded. This means that a total pressure of about 14,000 pounds (7 tons) is required to mold a disk of 3 in. in diameter. Such a disk has an area of about 7 sq. in., and this is the size upon which most of the projects described in this treatise have been developed.

If a press with a capacity of 7 or 8 tons is available in the school shop there will be no necessity of purchasing or building a press. The shop instructor will then need only to devise some methods whereby this press can properly receive the molding dies and exert its pressure upon them.

In the event that the pressure exerted by the press is unknown, it may be calculated by one of the formulas shown in Figure 1. If the press is of the simple screw type, its pressure can be calculated by the following formula:

$$W = \frac{6.28\,n\,L\,P}{1 + dn}$$

Where W is the total pressure in pounds which the screw can exert.
n is the number of threads per inch of the screw.
L is the effective length in inches of the turning lever.
P is the pressure in pounds exerted upon the lever by the operator of the jack.
d is the outside diameter of the screw.

This same formula can be used to calculate the pressure that a carpenter's or house jack will exert. Such a jack could well be used as a source of pressure for molding plastics, provided it will exert sufficient pressure. A suitable frame would have to be constructed or purchased so the pressure developed by the jack can be adequately applied to the molding dies.

Similarly, the pressure of a double screw and gear type of jack can be calculated by using the same formula plus taking into account the lever reduction given by the gears. See the formula in Figure 1 for calculating its pressure. The length of the lever arm may be increased by making a new lever, as shown, and using it in place of the old crank type of lever. There will be some restrictions, however, in the length that may be allowed for this new lever. If it is too long, it will fail. At any rate, the square end must be well hardened to prevent shearing off the corners. Then there is also the mechanical strength of the jack to be considered. If its strength is exceeded the jack will be wrecked.

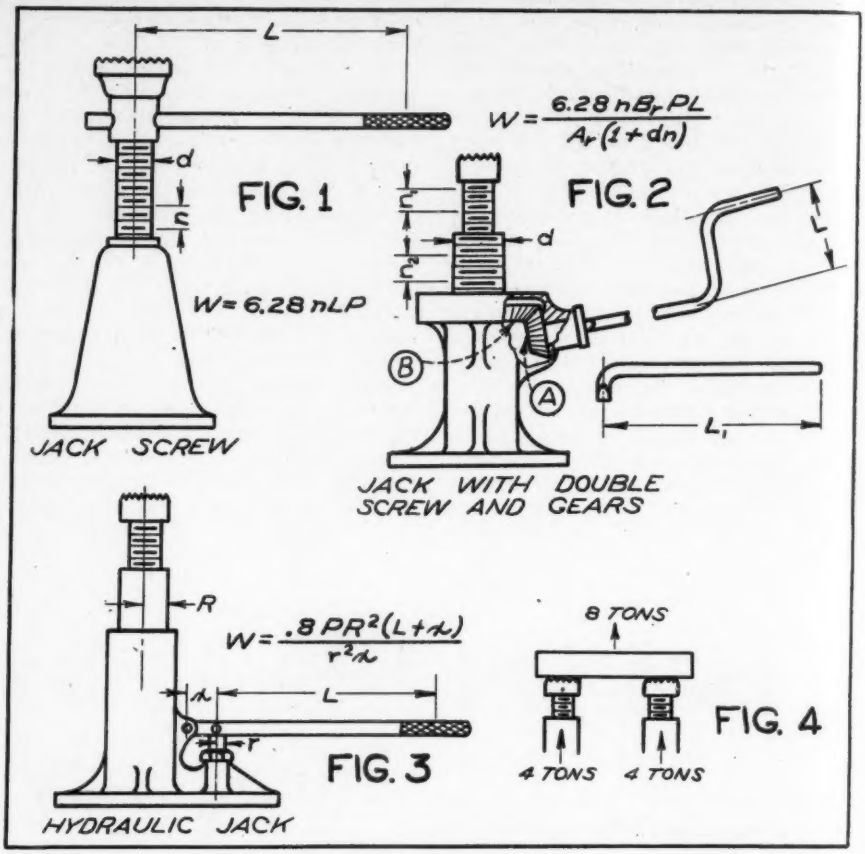
The pressure that a hydraulic jack will exert is calculated in just a little different manner. See formula in Figure 1.

The hydraulic type of pressure is much smoother in operation than any of the mechanical types, but the others, though more clumsy and inefficient, will work if they are large enough.

In the event that no single source of available pressure will be sufficient, it is possible to use two smaller jacks to develop sufficient pressure. In this case the total pressure exerted will be the sum of the two separate pressures of the individual jacks. It will be necessary, however, to carefully synchronize the operation of the jacks so that they rise together. See sketch in Figure 1, which shows two 4-ton jacks raising an 8-ton load.

When the source of pressure has been secured, it will be necessary to make a press frame so that the pressure of the jack can be fully applied to the molding dies. This frame may take a variety of forms. See Figures 2 and 3. Also see Figure 4 on page 294 of the September, 1942, issue of this magazine.

Perhaps one of the most easily constructed frames is that shown in Figure 2. It consists of two horizontal H beams tied together by four tension members which are 1½ in. in diameter. The ends of these rods are turned



Power calculations

In the formulas shown above, which make an allowance for efficiency:
W is the total pressure in pounds which the screw can exert
n is the number of threads per inch of the screw in Fig. 1
n = n_2 — n for screw shown in Fig. 2
L is the effective length in inches of the turning lever
P is the pressure in pounds exerted upon the lever by the operator of the jack
d is the outside diameter of the screw
A_r = radius of bevel pinion in inches
B_r = radius of bevel gear in inches
x = distance from center line of small plunger to the fulcrum
r = radius of small plunger
R = radius of large plunger
The efficiency of hydraulic jack is assumed to be 80 per cent

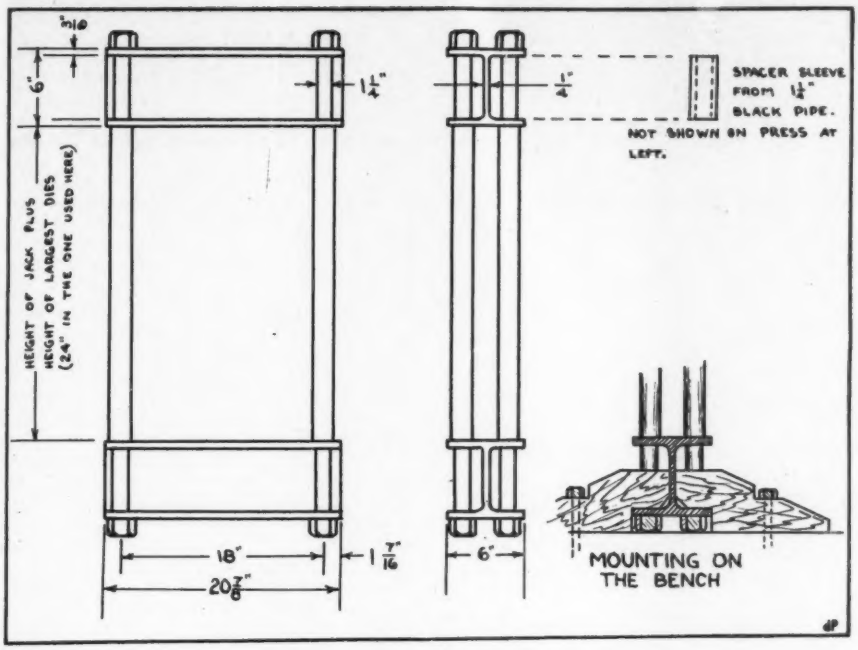


Fig. 5. Details of press frame

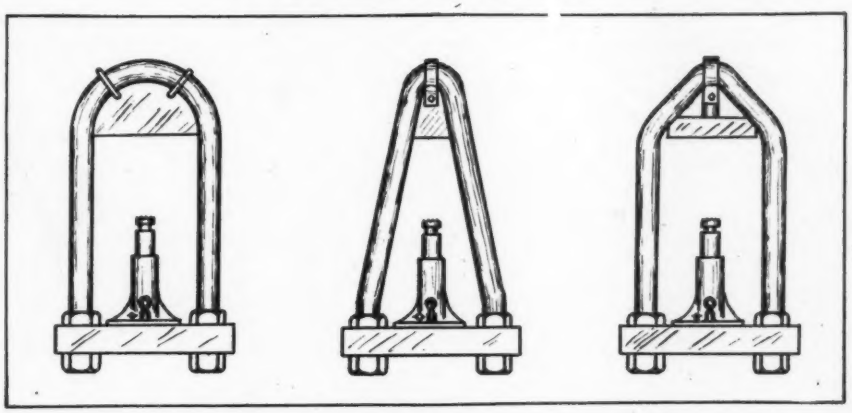


Fig. 6. Suggestions for press frames

down to 1¼ in., to form a flange or shoulder for the support of the beams when there is no load applied to keep them separated.

These 1¼-in. ends are then threaded with 7 NC threads to the inch. These threads cut the effective area of the cross section of the rods at that point considerably. The root diameter at the thread is 1.065 inches. For the four rods this makes a total effective area of 3.564 sq. in.

At an allowable working stress of 12,000 pounds per square inch, these four rods will withstand a total tension of over 40,000 pounds. This is 20 tons. The dimensions allow ample strength for any pressures up to that amount and slightly over it, if the operator cares to load the press a little beyond the limits set by factors of safety. With 20 tons pressure it is possible to exert a pressure of over 3000 pounds per square inch on a 3-in. diameter mold. It will also exert 2000 pounds per square inch on a 5-in. diameter mold. This is sufficient pressure for molding almost any type of plastic, particularly the thermoplastic types, which are the most adaptable to school use.

In figuring the sizes for the horizontal beams, there are a few considerations to be made. In the first place, since the loads are to be supported at the centers of the beams, a stronger beam must be used than would be necessary if the load were to be evenly applied throughout the length of the beam. To compensate for this factor, any load to be used must be considered as double its actual value. For example, consider eight tons as sixteen tons, and twenty tons as forty tons. Then, from any handbook for steel construction forms, the exact sizes and weights of beams necessary to support this load can be found.

In the press being described the span between the supporting rods was 18 in. The shorter this span can be made, the greater will be the strength and rigidity of the beams. A 6-in. H beam was used in the press illustrated, because it was the only material that could be found at the time. It has ⅜ in. thick flanges and ¼ in. thick web at the center, and it effectively supported loads up to 12 tons. It was not tested or used under greater loads, but would probably support much more than those that were actually imposed upon it.

The press should be constructed so that the neutral axis of the beam is perpendicular to the web at the center. This gives a much stronger construction than when the neutral axis is on the center line of the web.

The beam can be given additional strength by putting spacing sleeves on the tension rods and between the flanges of the beam. These sleeves are made from 1¼-in. pipe and should fit tightly between the flanges of the H beam. They prevent the web from buckling and transfer part of the load from the outer flanges to the inside flanges of the beam. If they were not used, the outer flanges would carry much more of the load than would the inside flanges.

There are a few presses on the market at the present time that are made for laboratory work in connection with plastics research. These presses are well made and work admirably should the instructor decide to forego the trouble of assembling a press and purchase one that is already built.

V BLOCKS FROM SCRAP

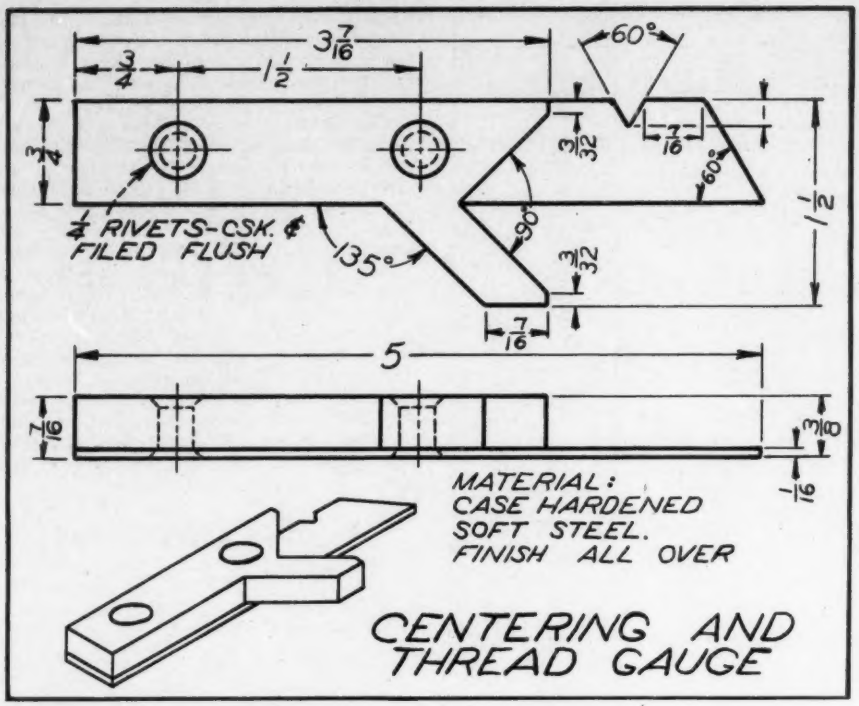
D. C. MARSHALL

High School
Manhattan, Kans.

Every school, home, and farm workshop needs V blocks, but many school shops do not have equipment for making them and material shortage will stop many that do have the equipment. Satisfactory blocks, however, can be made in any shop that has a hack saw and a welder or drilling equipment. All that is needed is a scrap of channel iron and another

V block made from scraps of channel and angle steel

of angle iron. Scraps can usually be found without difficulty. Saw both to the same length, then drill a hole in the center of the channel near each end. Next, clamp the angle iron in the channel with the corner in the center. Tack weld the corners to hold it. Then turn it over and weld through the holes that were drilled in the channel. If welding equipment is not available, the angle iron may be



riveted in place, provided the rivet holes are countersunk and the rivets finished flush with the surface.

CENTERING AND THREAD GAUGE

NORMAN W. MORGAN

Technical High School
Scranton, Pa.

The centering and thread gauge described herewith was adopted as a project for two reasons. It is a fine addition to a machinist's toolbox, and it can be used as a bench project, or as a combination drill press, milling machine, and bench project. It serves as a very fine layout problem for the beginner.

LEEWARD BIRD SHELTER

CLIFFORD K. LUSH

Supervisor of Industrial Arts
Minneapolis, Minn.

This bird shelter adjusts itself away from the wind, to provide a retreat for birds from the cold winter weather. The windows on either end are not for the birds, but for their observers.

Make the top and two ends of ¼-in. veneer. Lay out the design of one end on a 14 by 16-in. piece of plywood. For the window, bore a ½-in. hole within the circle at the circumference of the circle. Tack the two ends together and saw out the designs on a band saw. Use a jig saw or a fret saw to cut out the two windows.

Smooth the edges of the pattern with a sharp plane or chisel; then sandpaper and apply a sealer coat of shellac to all edges and the surfaces. Cut the top out of ¼-in. veneer, and finish to 14 by 16 in. Shellac this piece also.

Cut and finish the back and two rails out of ⅜ by 5 by 13½-in. material for the back, and ⅜ by 1 by 13½-in. for each rail. Bevel the top edge of the back and front top rail to the same pitch as the roof. Cut and finish the base to ¾ by 11¼ by 13½ in. Use a ¾ by 1 by 6-in. piece of birch for the cleat.

Fasten the cleat to the base with 1½-in. f.h. screws as shown. Fasten the back and lower rail onto the base, and brad on the two ends. Brad the upper rail onto the inner side of the top, as shown, and fasten the top in place with brads.

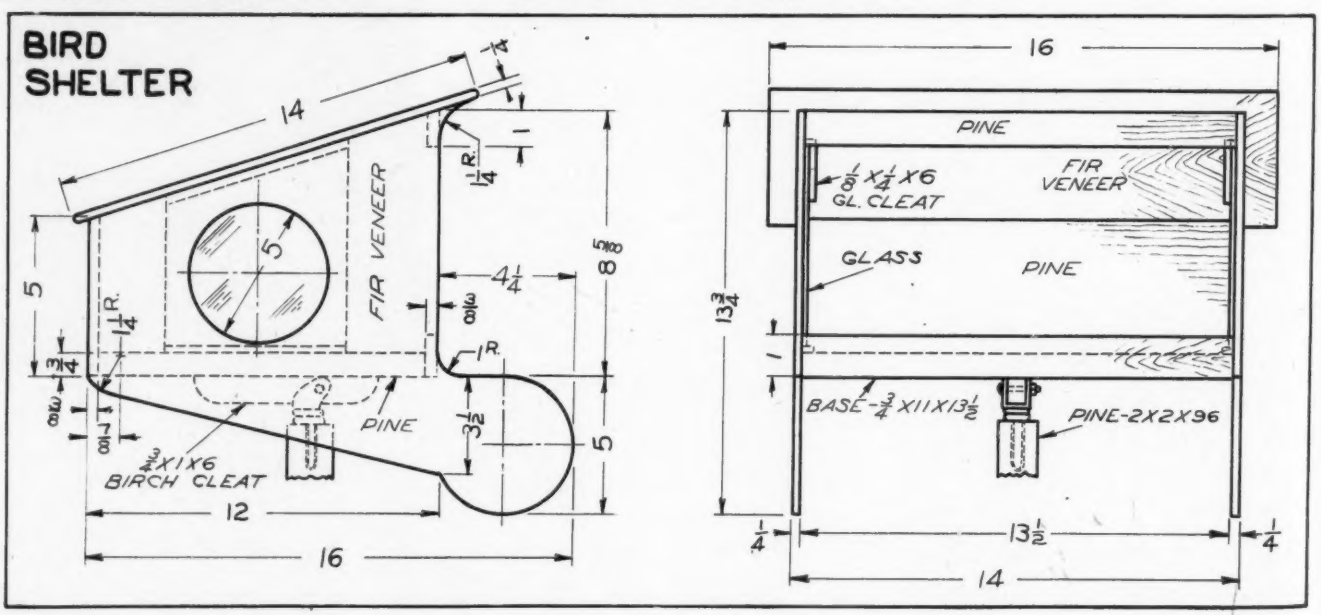
Remove the wheel and axle of a ball-bearing bed caster with a 1-in. or larger wheel. Force the caster onto the cleat under the house base at the center of balance. Drill a hole through the caster wheel hole and the cleat, and fasten on with a stove bolt.

Use a wooden post at least 2 in. in diameter, or 2 in. square, and about 6 or 8 ft. long to support the shelter. Bore a hole in one end of the post to fit the caster bearing very firmly. Paint the entire house, selecting colors appropriate to its future environment.

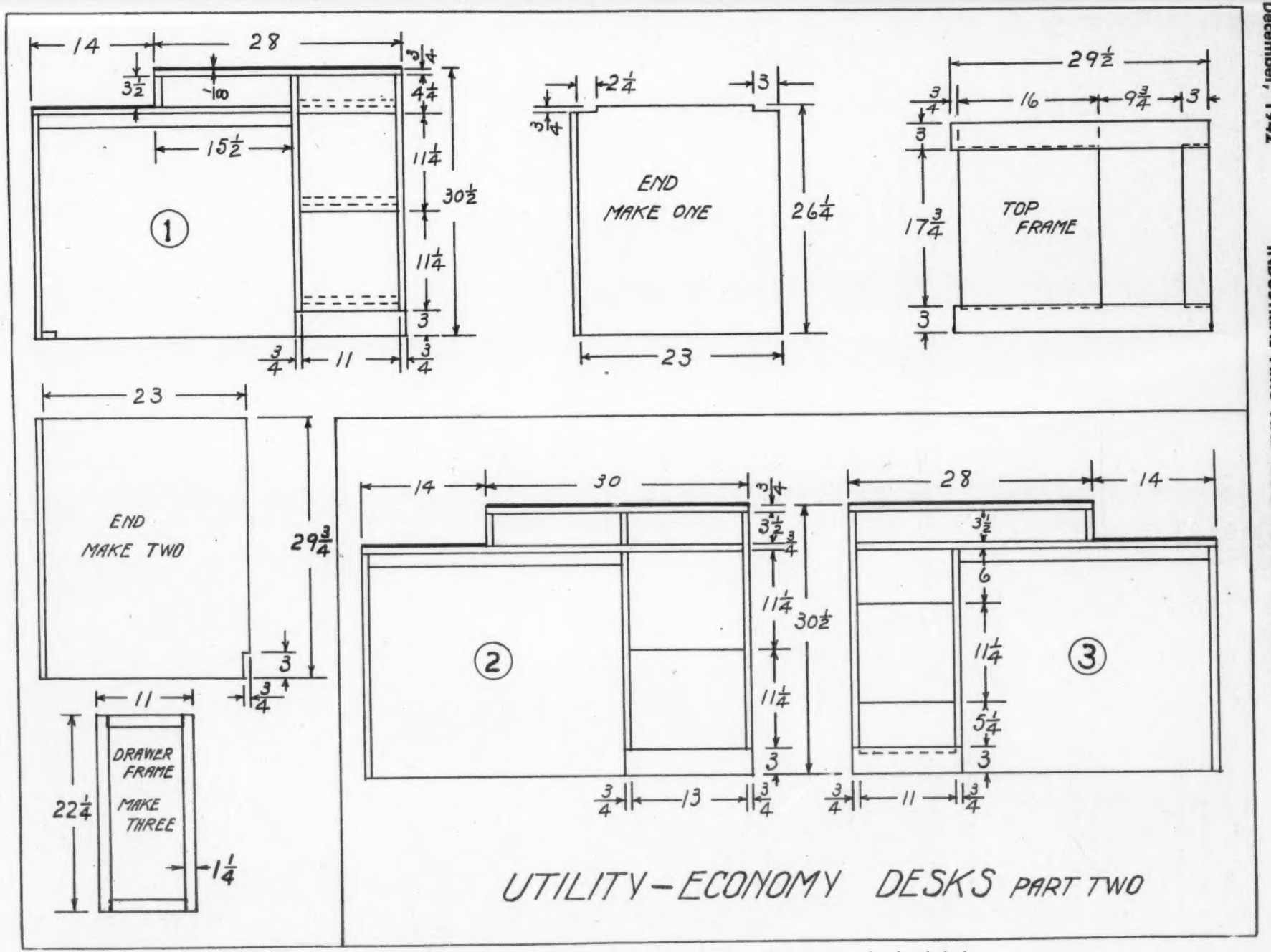
Cut two pieces of glass, to cover the windows, the top edge of which is the same pitch as the roof. Secure with ⅛ by ¼ by 6-in. wooden cleats at the top and bottom.

Bill of Material

No. Required	*Name*	*Material*	*Size*
1	Top	Fir veneer	¼ x 14 x 16 in.
2	Ends	Fir veneer	¼ x 14 x 16 in.
1	Back	Pine	⅜ x 5 x 13½ in.
2	Rails	Pine	⅜ x 1 x 13½ in.
1	Base	Pine	¾ x 14 x 13½ in.
1	Cleat	Birch	¾ x 1 x 6 in.
1	Post	Pine	2 x 2 x 8 ft.
4	Glass cleats	Pine	⅛ x ¾ x 6 in.



Leeward bird shelter



Typewriter desks by James McGregor, Pasadena, Calif. (See next page for description)

MORE UTILITY ECONOMY DESKS

JAMES MC GREGOR

Polytechnic Elementary and
Junior High School
Pasadena, Calif.

(See drawing on previous page)

Desk No. 1

This one is designed for use with a portable or standard typewriter. The top also has ample space for hand writing or drawing. The wide kneehole gives spacious leg room when moving from typewriter to writing top.

It is an advantage to have a typewriter and writing desk combined in one unit.

Although there is no provision made for storing the machine in this desk, the standard artificial leather cover or portable case will keep the dust out.

The height from the floor to the top of the typewriter table is 26¾ in., compared with 27-in. standard size. This is done to give the top drawer a reasonable depth and keep the writing top close to standard height. The typewriter shelf is made 14 in. wide to obtain a desk of moderate size to fit an average home, and at the same time to have a comfortable place to do writing or drawing with enough elbow room on the top. A 14-in. shelf is sufficient if the machine is anchored in some way to prevent movement by vibration.

Right side drawers have no rails showing at front, and this gives a pleasing effect. Drawer fronts at bottom edges project ¾ in. below the bottom edges of the drawer sides. The rail which shows at the bottom edge of the long top drawer may also be concealed if desired. All that has to be done is to cut the front edge of the top frame back ¾ in. the full length of this drawer.

There are only four frames to make in this model, the top one, part of which forms the shelf for the typewriter, and three drawer frames to slide the drawers on. These are fastened by tongue and groove joints ⅜ in. deep.

Although ¾ in. ply panel or plywood is specified for the desk ends, pine may also be used. Ply panel, although a little more costly, saves time in joining several pieces together, and cuts time in gluing and cleaning off.

A prestwood top is recommended on both upper and lower desk tops. This may be left off if desired. The slight additional cost, however, will add to the usefulness and life of the desk.

Desk No. 2 gives a 2-in. additional length in the top. This is an advantage if there is sufficient space in the home. Filing space is also increased because of larger drawers, enabling filing of folders parallel to drawer fronts.

Desk No. 3 provides one long drawer in the top. This is specially handy for boys interested in drafting, and will hold many drawings. The bottom drawer, it should be noted, is cut to 5¼ in. This allows two drawers of the same inside size. The bottom drawer has its front and side bottom edges flush. Since the 5¼-in. and 6-in. drawers are the same size inside, time is again cut down.

Whether the typewriter is to be placed at the right or left side of the desk is something which the individual concerned has to decide. The left side seems the natural place for a right-hand person, since drawers will then be right hand.

In desks 2 and 3, note that top frames run the full length of the desk, and not just the length of kneehole as in desk No. 1.

Bill of Material — No. 1 Desk

No. Required	Name	Material	Size
1	Ends	Douglas fir ply panel, 24 x 96 in.	¾ x 23 x 26¼
2	Ends	Douglas fir ply panel, 24 x 96 in.	¾ x 23 x 29¾
1	Baseboard	Douglas fir ply panel, 24 x 96 in.	¾ x 3 x 12½
1	Drawer front	Douglas fir ply panel, 24 x 96 in.	¾ x 3½ x 14¾
1	Top	Pine	¾ x 23¾ x 28
1	Top	Pine	¾ x 1½ x 28¾
1	Top	Pine	¾ x 3½ x 23¾
2	Top frames	Pine	¾ x 3 x 29½
1	Top frame	Pine	¾ x 3 x 18½
1	Top frame	Pine	¾ x 16 x 18½
1	Top	Tempered prestwood	½ x 24 x 48
6	Drawer frames	Pine	¾ x 1¼ x 22¼
6	Drawer frames	Pine	¾ x 1¼ x 9¾
1	Drawer front	Pine	¾ x 3½ x 14¾
2	Drawer fronts	Pine	¾ x 11¼ x 11
4	Drawer sides	Pine	½ x 3½ x 22¾
4	Drawer sides	Pine	½ x 10½ x 22¾
1	Drawer back	Pine	½ x 2¾ x 14¼
1	Drawer back	Pine	½ x 2¾ x 10½
2	Drawer backs	Pine	½ x 9¾ x 10½
3	Drawer bottoms	Douglas fir ply wall	¼ x 10½ x 22¼
1	Drawer bottom	Douglas fir ply wall	¼ x 15 x 22¼
1	Bottom cleat	Pine	¾ x 1½ x 23
1	Back	Douglas fir ply wall	⅜ x 30½ x 42

SAFETY IN THE SCHOOL SHOPS

ROY R. VAN DUZEE

Director of Vocational and Adult Education
West Allis, Wis.

General Safety Rules for Metalworking Shops

Mr. Ferguson, Mr. Froelich, Mr. Rose, Mr. Stone

1. Students must be attired in proper shop dress as specified by the instructor in charge. Coveralls, overalls and jacket, apron or shop smock will usually be acceptable.

2. Playing, scuffling, or inattention to work will be cause for suspension or expulsion from the class.

3. Only one person shall be allowed at a machine at one time unless given permission by the instructor in charge.

4. Students will not be permitted to operate a machine until a complete demonstration has been given by the instructor. The demonstrations will be either one or all of the following types:

a) Group demonstrations before the entire class.

b) Group instructions to a small group who have all been assigned to one type of machine, such as lathe or drill press, etc.

c) Individual instructions to each individual before he starts a machine with which he is not familiar.

5. Unfamiliar or dangerous setups must be inspected by the instructor before the machine is started.

6. Machines must never be cleaned, adjusted, or repaired while they are running.

7. All guards must be in place when the machine is in use. No guards must be removed at any time without permission from the instructor.

8. The hands should be kept behind the cutting edge of all cutting tools.

9. Goggles should be worn at all jobs where there is danger of hot or sharp gritty particles getting into the eyes.

10. The use of worn-out or improper tools such as damaged hammers, hammers with loose handles, files without handles, damaged cold chisels, etc., is prohibited at all times.

11. Permission to throw in power switches must be obtained from the instructor. Warning must be given to all who are near the machines before the switch is thrown in.

12. Keep the floor free of tools, stock, and litter. Round stock on the floor is especially dangerous.

13. Hand tools to another, do not toss them.

Safety Precautions to Be Observed in Connection With Fire and Fire Prevention

1. Familiarize yourself with the location of the fire extinguisher and the safety blanket.

2. Never play or tamper with fire safety devices. This is an offense punishable by severe penalty under the law.

3. If your clothes catch fire, hasten to the safety blanket, grasp the loop with one hand, rotate the body, and wrap the blanket around the body as the blanket is pulled from its case. The use of the blanket will be demonstrated to you. *Do not* wrap the blanket around your head. If you do this, the smoke and fumes from the fire will be drawn into your lungs or injure your eyes.

4. If a fire starts in the shop use the following procedure:

a) The nearest person to the fire extinguisher will immediately make use of it to extinguish or attempt to extinguish the fire.

b) The nearest ones to doors leading to other rooms will immediately close these doors.

c) Keep calm, don't get excited, use your head. Oftentimes more people are killed or injured through hysteria than by the fire itself.

5. When a fire alarm is sounded drop all work *immediately* and walk rapidly to the nearest exit.

Safety Precautions to Be Observed in the Use of the Grinder

1. The grinder must never be used without the instructor's permission.

2. Never use a grinder without the proper protection for the eyes. Most grinders are provided with safety shields. If for any reason these are out of order, goggles must be used until such time as the shields are in place.

3. The rest must be set as close to the wheel as possible, and a little above the center line of the arbor, to prevent work getting between the wheel and the rest.

4. Avoid, as much as possible, standing directly in front of the wheel when grinding. Never stand directly in front of a new wheel the first time it is used. It may be a cracked or a weak wheel and break into pieces on starting.

5. Small pieces should not be held with the hand when grinding. They must be securely clamped in a clamp or other device.

6. Use great caution in regard to grinding large pieces on a light grinder such as we have in our shops. It may break the wheel and injure the workman with flying pieces.

7. Avoid grinding soft metals such as lead, aluminum, brass, copper, etc., on the grinding wheel. It clogs the wheel and makes it useless as well as dangerous for grinding steel.

8. Hot metals should never be ground on the grinding wheel. It heats the stone and weakens the bond that holds the grit together.

9. Never put water on a dry grinding wheel.

10. Do not grind on the side of a wheel.

11. Keep the face of the wheel free from oil. The oily spot will not wear away as rapidly as the dry part. This throws the wheel out of balance and causes vibrations in the stand.

Safety Precautions to Be Used In Starting and Using Gas Furnaces

1. Do not start the forge, melting furnace, or heat-treating furnace without a demonstration by your instructor.

2. When starting the furnace do the following things in the order mentioned:

a) Open the air valve and turn on the fan.
b) Use a torch lighter and ignite the pilot light.
c) Hold the pilot light in the furnace and slowly open the gas valve.
d) Adjust the gas and air valves to get the desired flame.

3. Do not stand in front of the furnace or look into it when igniting the gas. Flames may flash out into your face or ignite your clothing.

4. In case your clothing catches fire, hasten to make use of the safety blanket. See item 3 of "Safety Precautions to Be Observed in Connection With Fire and Fire Prevention."

5. Do not start the forge or heat-treating furnace when several other persons are standing near by.

6. If fire starts around the forge or furnace make immediate use of the fire extinguisher. If the fire gets out of control follow instructions given in sheet entitled "Safety Precautions to Be Observed in Connection With Fire and Fire Prevention."

Safety Precautions in Handling Hot Metals

1. Do not carry a ladle of molten metal from the melting furnace to the mold without first giving warning. When warning is given, everyone should stand back some distance from the person carrying the ladle of molten metal.

2. Never throw a piece of wet or oily metal into a pot of molten metal. The wet metal will cause an explosion in the pot of molten metal. Men have been blinded in this way.

3. Do not hand a piece of hot metal to another person even though you may be holding it with tongs. He may think that it is cool and grasp it with his fingers.

4. Do not look into the gate or riser of a mold while the metal is being poured. Molten metal may be blown up into your face.

5. When handling hot metal with tongs, hold it as low as possible. Someone may accidentally or thoughtlessly jostle you and force the metal against someone's face.

6. Never pick up a piece of metal from the floor near the forge with your fingers. Use pick-up tongs; the metal may be hot.

7. If you get burned, put some kind of oil on the burn immediately. Get such first aid as your instructor can give you and go to a physician. Serious burns are exceedingly painful and often heal with difficulty. They may leave the person badly and permanently disfigured.

8. When melting metal for foundry work, keep a time record on the heating of the metal in order to avoid overheating. Overheated metal may cause the mold to blow up and inflict severe burns on you and others.

9. Be sure to follow the instructions on the sheet entitled "Safety Precautions to Be Used in Starting and Using Gas Furnaces" when starting the forge or melting furnace.

WHITTLING-JACKKNIFE TECHNIQUE

W. BEN HUNT, Hales Corners, Wis.

(*Continued from page 398 of the November, 1942, issue*)

The Loon

The loon shown in Figures 100, 101, and 102, is a very striking bird, which one does not have the opportunity of viewing at close range very often. With its simple markings of black and white, its long graceful body and small head, and its awkward feet, it is the champion diver and underwater swimmer. Its weird and lonesome call echoes and re-echoes through the north woods day and night. To

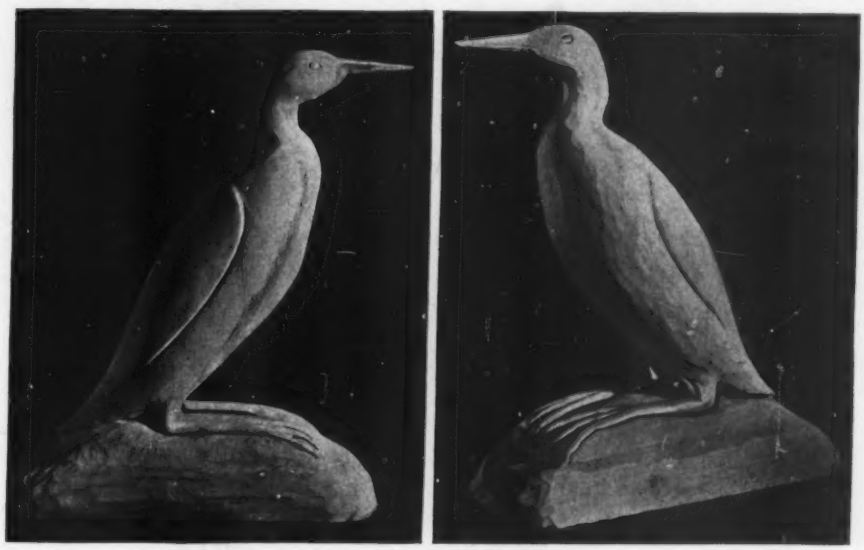


Fig. 100. Finishing the whittling on the loon

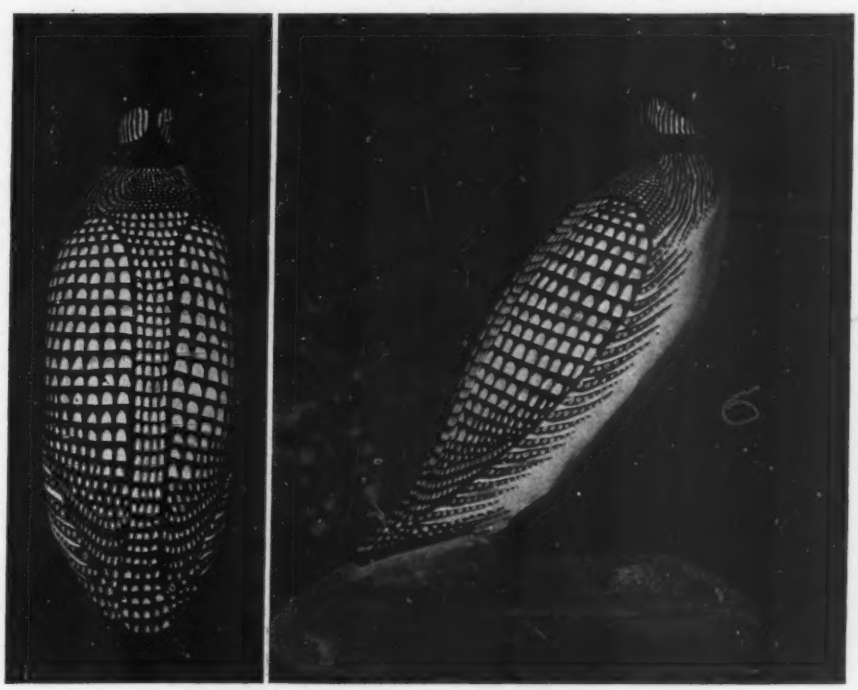


Fig. 101. Painting the loon

see the male loon performing his dance around his mate, seemingly walking, or rather dancing, upon the surface of the water, is a sight which few have witnessed, but which when once seen, is never forgotten.

To whittle a loon the size shown here, a piece of wood, 2½ in. thick, 7 in. wide, and 7½ in. high, is required. The extra piece for the subbase can be any piece of softwood ⅜ to ⅞ by 3 by 6½ in. The subbase is glued on after the whittling is done, to give the bird better stability and to prevent the regular base from chipping or splitting. The grain of the bird and base is vertical while the subbase is horizontal.

Lay out the outline onto the wood and cut out the silhouette with a band or jig saw. Cut across at the base of the bill as shown in Figure 102. Then, carefully, so as not to chip out or split the head, drill a 7/16 or ⅜-in. hole in the center of this crosscut, and with glue or plastic wood, set in a piece of dowel for the bill. This bill will then have the grain running the long way, and therefore, will be less likely to break off.

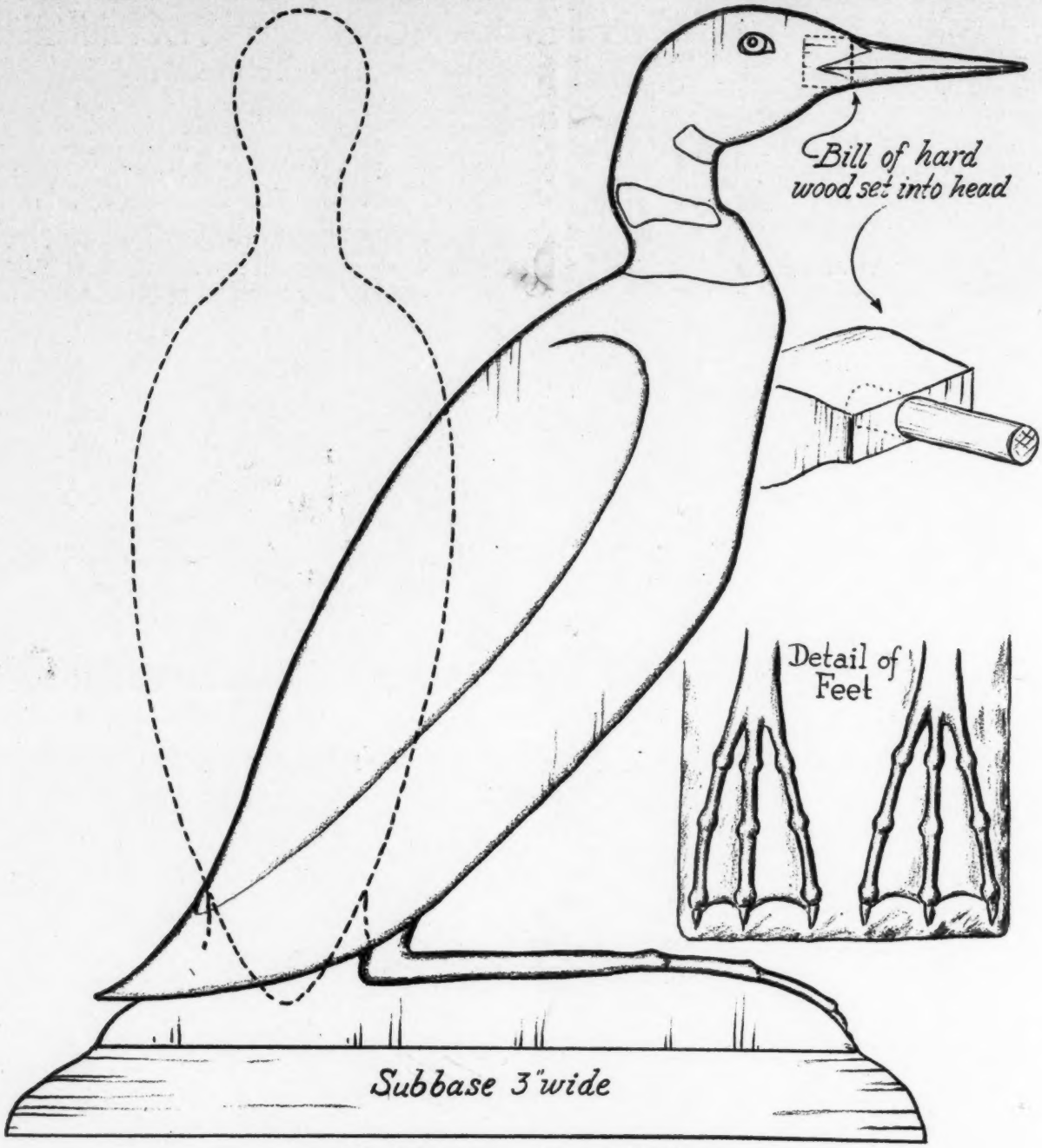


Fig. 102. Full-size pattern of the loon

Perhaps the most difficult part of this whittling will be the feet and legs. A razor-sharp knife edge will be required for this part of the job.

The wings are quite close to the body, being raised probably 1/16 of an inch. The base can be left rough, but the body of the bird should be sanded perfectly smooth as this bird is the last word in streamlining. A cross section of the body should not be perfectly round, but rather flattened slightly in the front and back. Figure 100 shows two views of the loon as the job of whittling nears the end.

To color the bird, paint the body white and the head and neckbands black. Then paint the markings with black paint on the white as shown in the two views in Figure 101. The author used poster water colors to get away from the gloss of oil paint, although if so desired, oil paints may be used. It will be found that the poster colors dry very much faster than do the oil paints.

The markings as shown are more or less conventionalized, but are realistic enough to check any criticism. Study Figure 101 care-

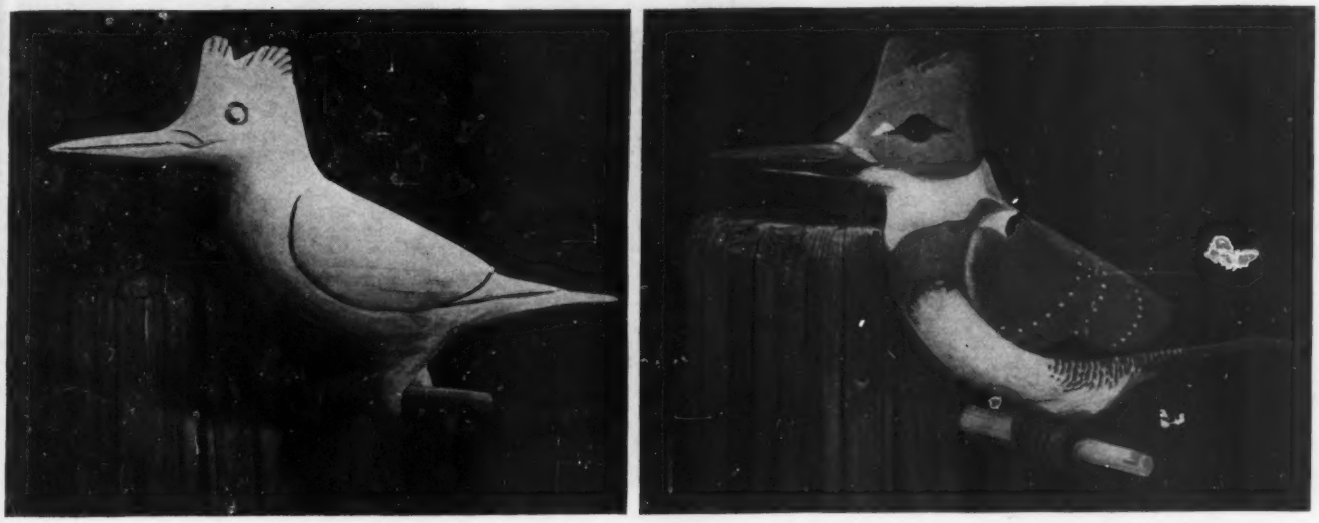


Fig. 103. Finishing and painting the kingfisher

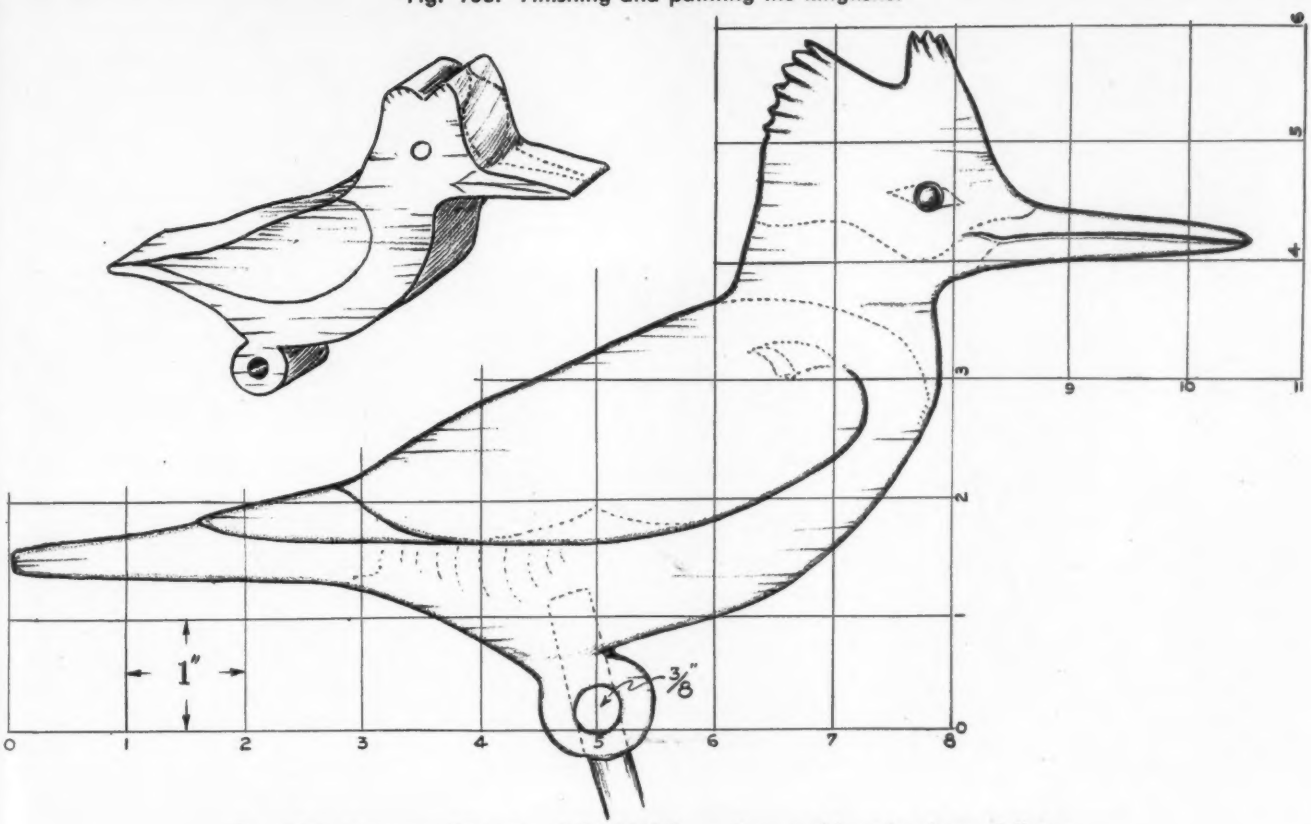


Fig. 104. Because of the size of this bird the pattern could not be shown full size

fully. In some cases, like at the sides below the wing, the black is painted over the white and the round dots are then again painted over the black with white paint.

The bill should be a dark gray and the eyes are red with black pupils.

The legs and feet are black and the base should be painted a moss green.

The Kingfisher

For those who like "bird sticks" there is a chance to do a real whittling job which will far surpass those jig-sawed out of ¼-in. plywood. The whittled birds really look like birds regardless of which way they are facing. Most of the larger birds, such as robins and cardinals, can be whittled out of 2-in. wood.

Living in the country, the author has enough real birds around his home, but he made the kingfisher shown in Figure 103, to guard the outdoor goldfish pond, as he does not care for any more visits from real kingfishers, who seem to think 3 and 4-in. goldfish are real delicacies. He, therefore, whittled a very realistic kingfisher who acts as a guard. Kingfishers, as a rule, take complete charge of certain territories along lakes and rivers, and woe to any other of his kind that trespass. Therefore, the whittled kingfisher.

To color the kingfisher, give the entire body a coat of white paint and then paint the parts showing gray in the photograph a bluish gray. The bill, eyes, shoulder spots, wing tips, and feet are black. After the paint is dry, apply two coats of spar varnish to protect the bird against the elements.

Other birds that the whittler may wish to make can easily be traced or copied from one of the many bird books available.

Usually birds for garden sticks are mounted on a ⅜-in. birch dowel fitted into a ⅜-in. hole placed where the feet are. This saves a lot of trouble. However, in the kingfisher, a hole was drilled crosswise, as shown in Figure 104, and a round stick glued into it to give it

a more natural appearance. Then another hole was drilled as shown by the dotted lines in Figure 103, into which a length of 3/8-in. dowel rod is then stuck. This, in turn, is set into the ground at the edge of the pool, thus giving a rather limber roost for the goldfish guard.

TEN IDEAS FOR THE SHOP

HOMER C. ROSE

Armored Force School
Fort Knox, Ky.

Many little problems add up to make larger problems; many little tricks save wear and tear on teacher and students. It is important to make use of all the tricks in the trade in order to devote full time to the most important business — actual teaching.

These ten devices have proved their worth in the shop.

Vise Plates

Channel iron of the right size, with the edges bent to fit the vise jaw, makes excellent protective plates. See Figure 1. These plates are heavy enough to stand hard use, and yet are soft enough to protect all ordinary work from defacement. The plates will slide off, but will not fall off during use. Copper, sweat soldered to the face of the channel iron, may be used for the finer work, and will stand up much longer than solid copper plates. The ordinary bent and torn copper vise plates are unsightly, dangerous, and expensive.

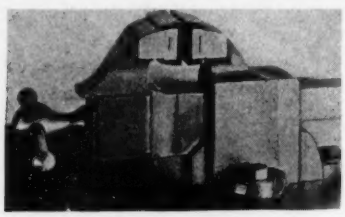


Fig. 1. Channel-iron vise-jaw protectors

Tap and Tap-drill Rack

A rack to hold common taps, tap drills, and body drills in proper relationship will save time in the shop and serve to emphasize the relationship to the students. See Figure 2.

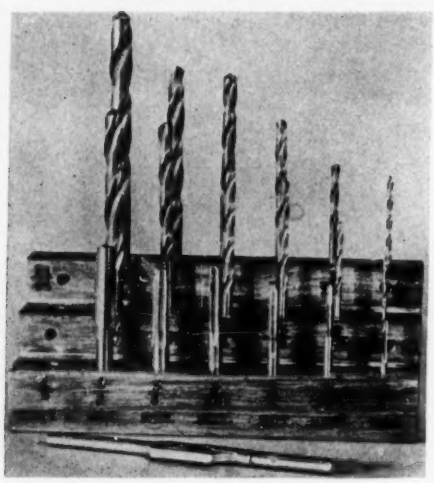


Fig. 2. Tap and tap-drill rack

Sal Ammoniac Block Holder

The cast aluminum container shown in Figure 3 holds the sal ammoniac block and an ink bottle of flux. Since the aluminum does not rust, it provides a clean, neat holder. Cleanliness in soldering must always be emphasized.

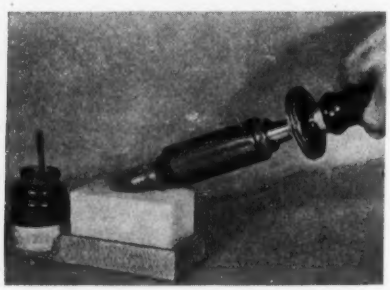


Fig. 3. Sal ammoniac block holder

Short-Piece Box

A box, such as is shown in Figure 4, fastened to the squaring shear helps to keep the floor clear of shearings. It is always in place and facilitates sweeping the shop.

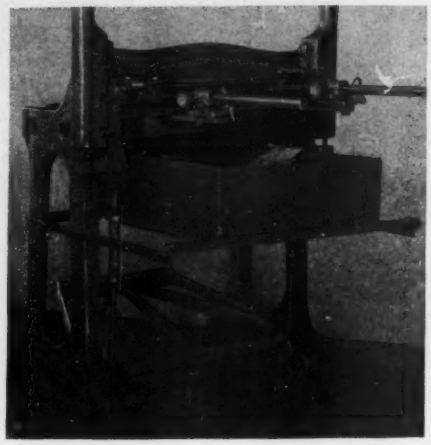


Fig. 4. The short-piece box

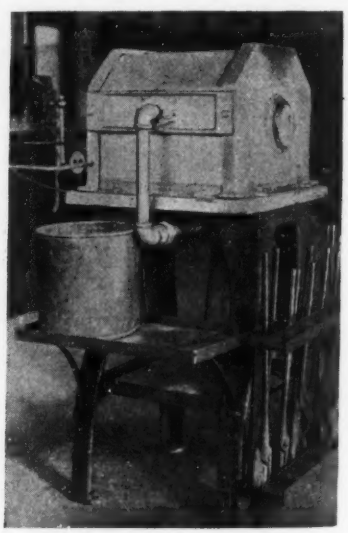


Fig. 5. The tong rack

Tong Rack

A tong rack such as the one shown in Figure 5 keeps the tongs in an orderly arrangement with the hot ends down where there will be less danger of burns. A shelf on the forge to hold the quenching tank helps to keep the floor clear. Another steel shelf between the legs provides a place for hardies or other special tools.

Chiseling Saddle

A saddle of machine steel bent to fit the anvil block provides a convenient place for chiseling. See Figure 6. The plate helps to draw the student's attention to the fact that the face of the anvil should be kept free of chisel marks. If the saddle is painted a bright color it is less likely to be misplaced in the shop.

Anvil-Horn Guard

Properly sharpened anvil horns can be dangerous. Trousers have been torn and legs bruised by the sharp point. A guard, such as is shown in Figure 7, may be easily constructed from a short length of pipe and a length of ordinary sash curtain spring.

Drill-Press Vise Holder

A vise holder may be fastened to the drill press table, as shown in Figure 8. The vise then will be conveniently located, and less likely to fall on the floor when not in use. An

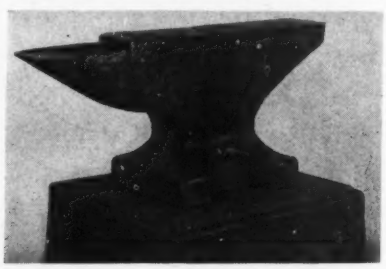


Fig. 6. Chiseling saddle

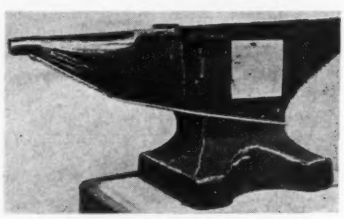


Fig. 7. Anvil horn guard

Fig. 8. Drill-press vise holder

oilcan holder may also be fastened to the frame.

Metal Finishing Panel

A panel, such as is shown in Figure 9, on which samples of metal finishes are mounted is useful in the shop. Various finishes may more accurately be examined, discussed, and selected for shop projects. Typewritten identification labels may be pasted on the back.

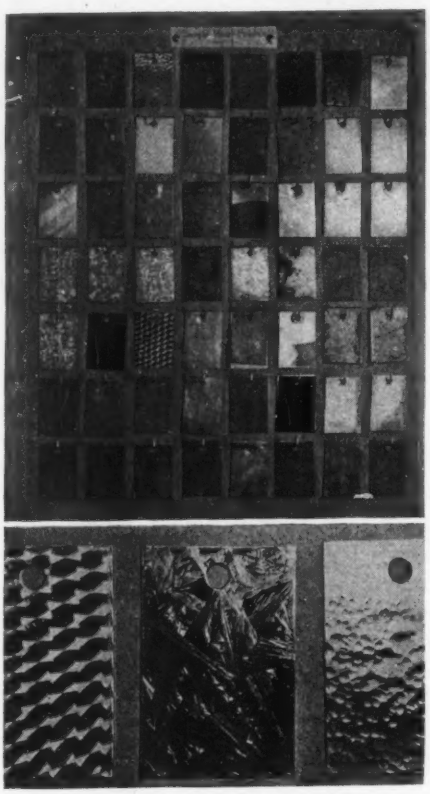


Fig. 9. Metal-finishing panel

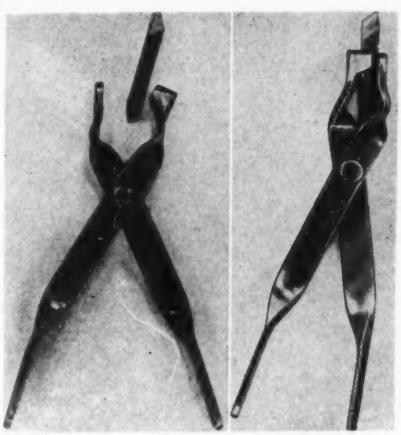
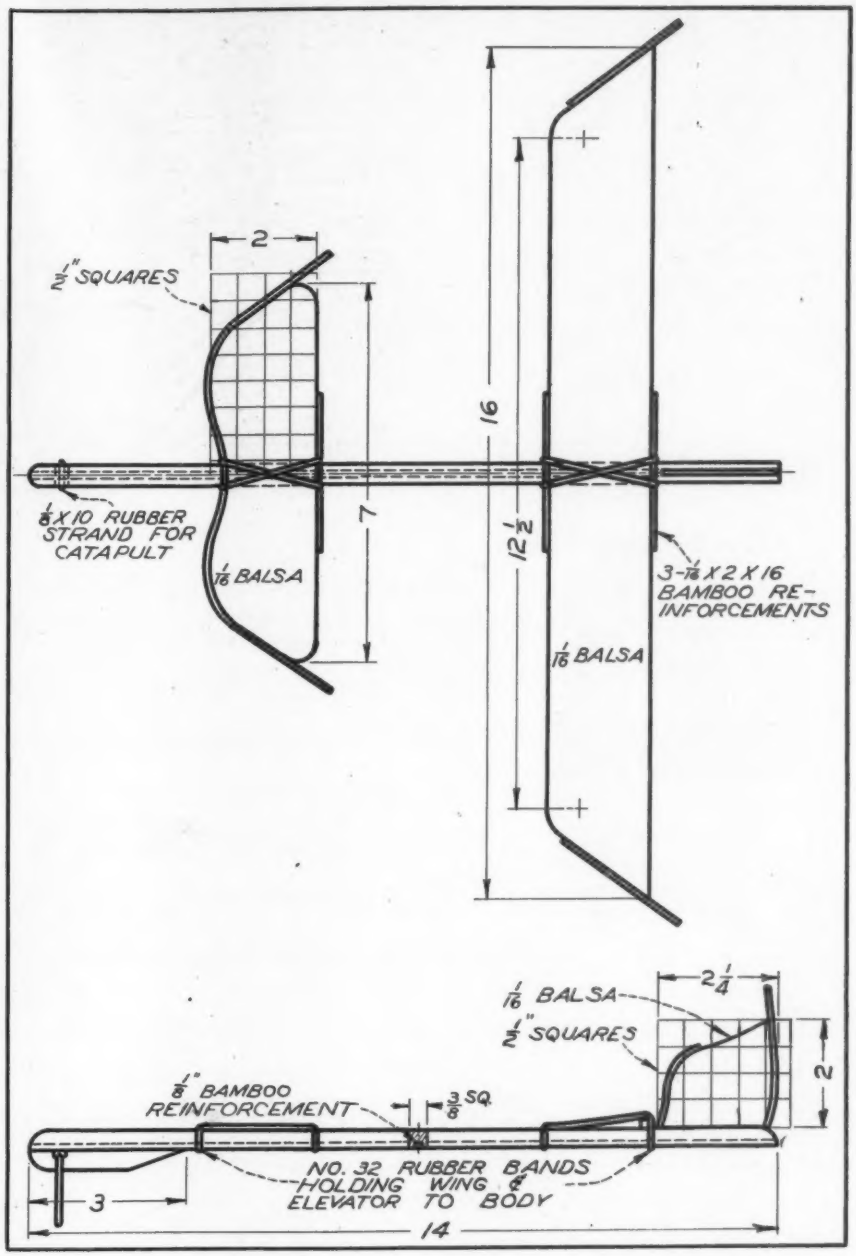


Fig. 10. Tool bit grinding pliers

Tool Bit Grinding Pliers

Marred or unsightly toolholders often are produced by grinding tool bits in them. The pliers shown, in Figure 10, made of cold-rolled steel, facilitate grinding tool bits, and save toolholders and fingers.



Bamboo reinforced glider. Terence Vincent, U. S. Director Miniature Aircrafters, Ypsilanti, Mich.

AIRPLANE-CONTROL DEMONSTRATION MODEL

FRED C. FINSTERBACH

Buffalo, N. Y.

The demonstration model is a "must" for every industrial-arts and science teacher interested in presenting the fundamental theory of flight to his students.

This model was expressly designed to be made of inexpensive, easily manipulated materials. A few strips of thin wood, several paper clips, a couple of common pins and some button thread are about all of the needed materials.

Anyone who can use a coping saw, an awl and read a drawing can make it in a few hours. It, however, lends itself readily to mass production of parts, if a band or jig saw is available. The pulleys, probably the most difficult of the parts to be handmade, could be made by the hundreds on a speed lathe.

For the drafting class, it embodies many principles and features not usual in machine drawings. The science teacher will have no difficulty putting across a lesson illustrated by the model, nor will the shop teacher have to do much of a selling job to present it as a project.

Insofar as possible all necessary details, including some operations and a list of tools, have been placed on the drawing. The only extreme care necessary is to prevent lost motion in the link and saddle assembly of the stick and bar. The cables must be kept taut

(Continued on pages 446 and 448)

HOW DOES THE DESIGNER SECURE ORDER?

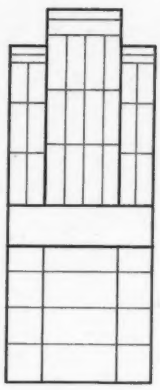
Order in design is the result of a reasoned, logical arrangement of elements. The perception of order tends to promote a feeling of security, with the result that a design giving evidence of order offers lasting satisfactions. Order may be had through a number of means, among which are the following:

1. Through clear evidence of function.

Paul Lamerie (London, 1720) left no doubt as to the purpose of his silver teapot.

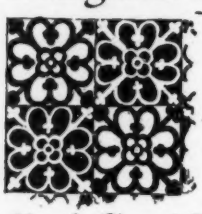
Desk and Bookcase from The Cabinetmaker and Upholsterer's Guide, by Hepplewhite.

2. Through reducing complex combinations of parts or elements to a relatively few simple forms. This may be done, as shown at the right, by emphasis of a few major parts with heavier lines, change of plane or height, or use of different materials. A simple relationship of parts is desirable in giving a unified effect to a design.



Analysis of the divisions of the Desk and Bookcase

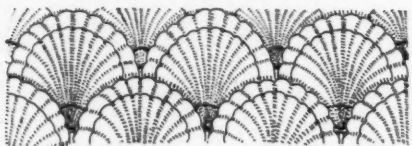
3. Through regular or sequential arrangement of elements.



Repeat of One Unit over a Surface

French Church Tiles

Repeat in Band - Typographic



Radial Development - Wallpaper

Flow Sequence - Hands from an American Clock

4. Through unity of style elements within a design or in related designs.

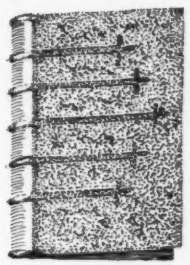
Wrought Monel Metal Keys from the Cathedral at Bryn Athyn, Pennsylvania

Plate 8. Continuation of design course by Burl N. Osburn, Director of Industrial Arts, State Teachers College, Millersville, Pa.

HOW DOES BALANCE AFFECT DESIGN?

Balance is the result of the interplay of forces; the resolution of stress & strain. Its effect is one of repose and satisfaction. Lack of balance creates a desire for change. The designer employs various means to attain balance, such as these:

1. Through giving evidence of adequate strength. The chair must convince its user that its material and structure will safely bear his weight. A more subtle case is the spacing of the bands in the book to give the effect of a firm base.



Leather-bound Book

Modern Tubular Chair

2. Through a functional relationship of all parts.

18th Century Venetian Goblet

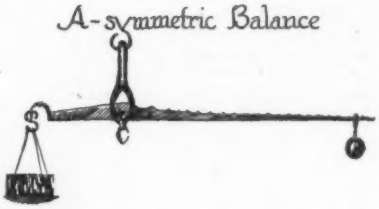
3. Through equalized arrangement with respect to an axis, a center of interest, or a line of motion.

Bi-symmetric Balance

Equal areas on both sides of a central line, equal color value, equal amount and kind of ornament, same arrangement

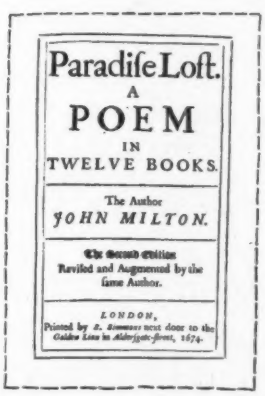
Chippendale Key Plate

A-symmetric Balance



Large area of: smooth surface -- Small area of: ornamented surface
plain grain --- figured grain
weak color - - - strong color
Large weight near center of interest - - -
small weight at distance

Modern Silver Brooch



MODERN
BOOK
DESIGN

• • Utilizes All The Devices of a new age to secure its novel effects: striking colors, unbalanced pages, simple body type, hand-drawn, appropriate ornament, bled illustrations, and fine paper. • • • •

Good proportion is, to a large extent, a matter of balance between parts; each having the size best suited to its purpose.

Plate 9. Design course by Burl N. Osburn, Director of Industrial Arts, State Teachers College, Millersville, Pa.

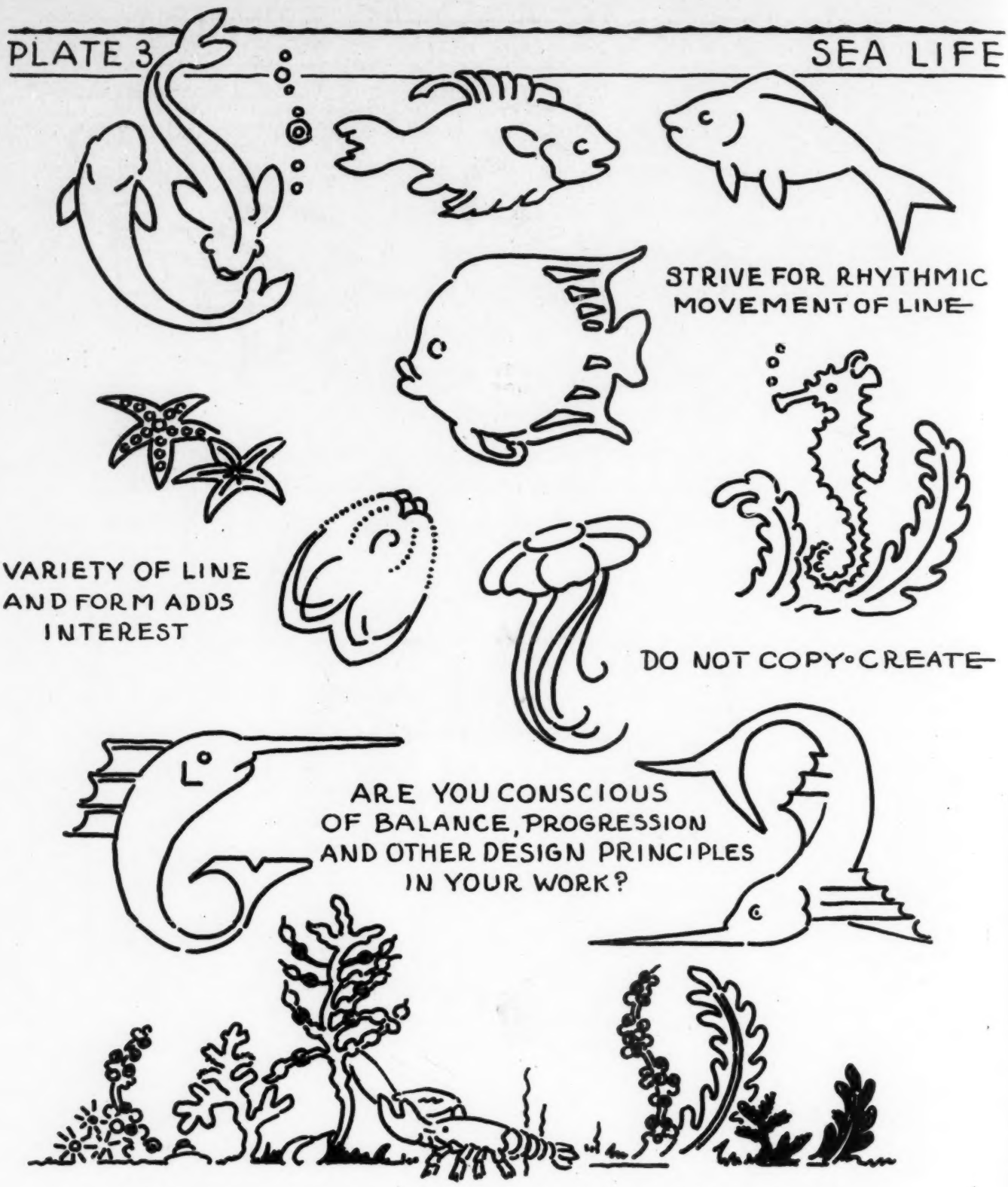


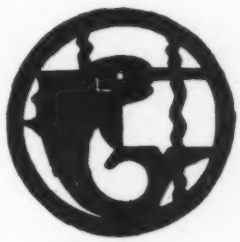
PLATE 3
SEA LIFE
STRIVE FOR RHYTHMIC MOVEMENT OF LINE
VARIETY OF LINE AND FORM ADDS INTEREST
DO NOT COPY • CREATE
ARE YOU CONSCIOUS OF BALANCE, PROGRESSION AND OTHER DESIGN PRINCIPLES IN YOUR WORK?

Plate 3. Continuation of creative design course by Richard F. Bailey, chairman, art department, Central High School, Providence, R. I.

PLATE 4 — APPLICATION — SEA LIFE

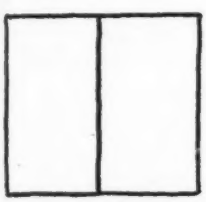
ENAMEL MEDALLION

PAPER KNIFE

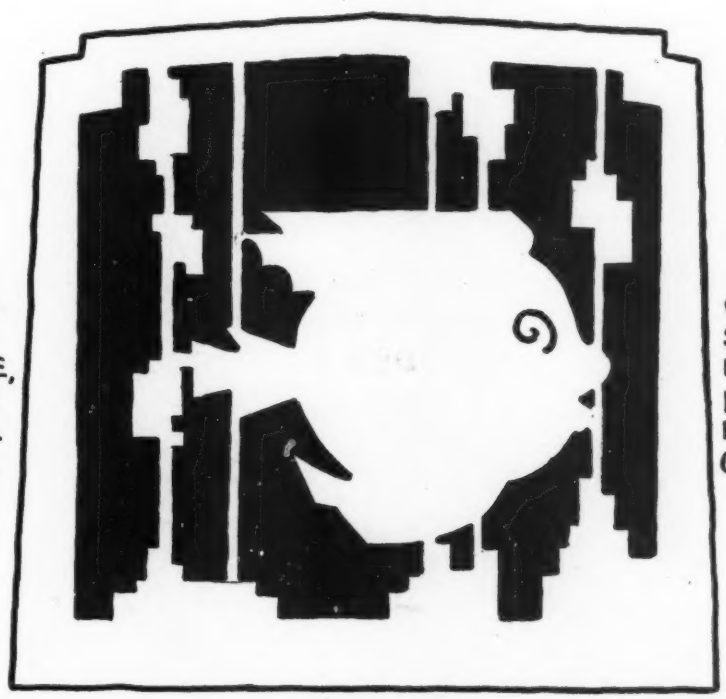


BROOCH

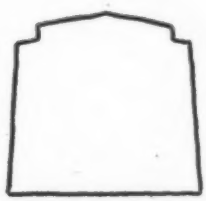
THESE DESIGNS ARE SUGGESTED ADAPTATIONS · DO NOT COPY · · · · · · · · CREATE ORIGINAL DESIGNS



BASIC FORM WITH INCEPTIVE AXIS WHICH, AS A RULE, IS DETERMINED BY THE VERTICAL OR HORIZONTAL SHAPE



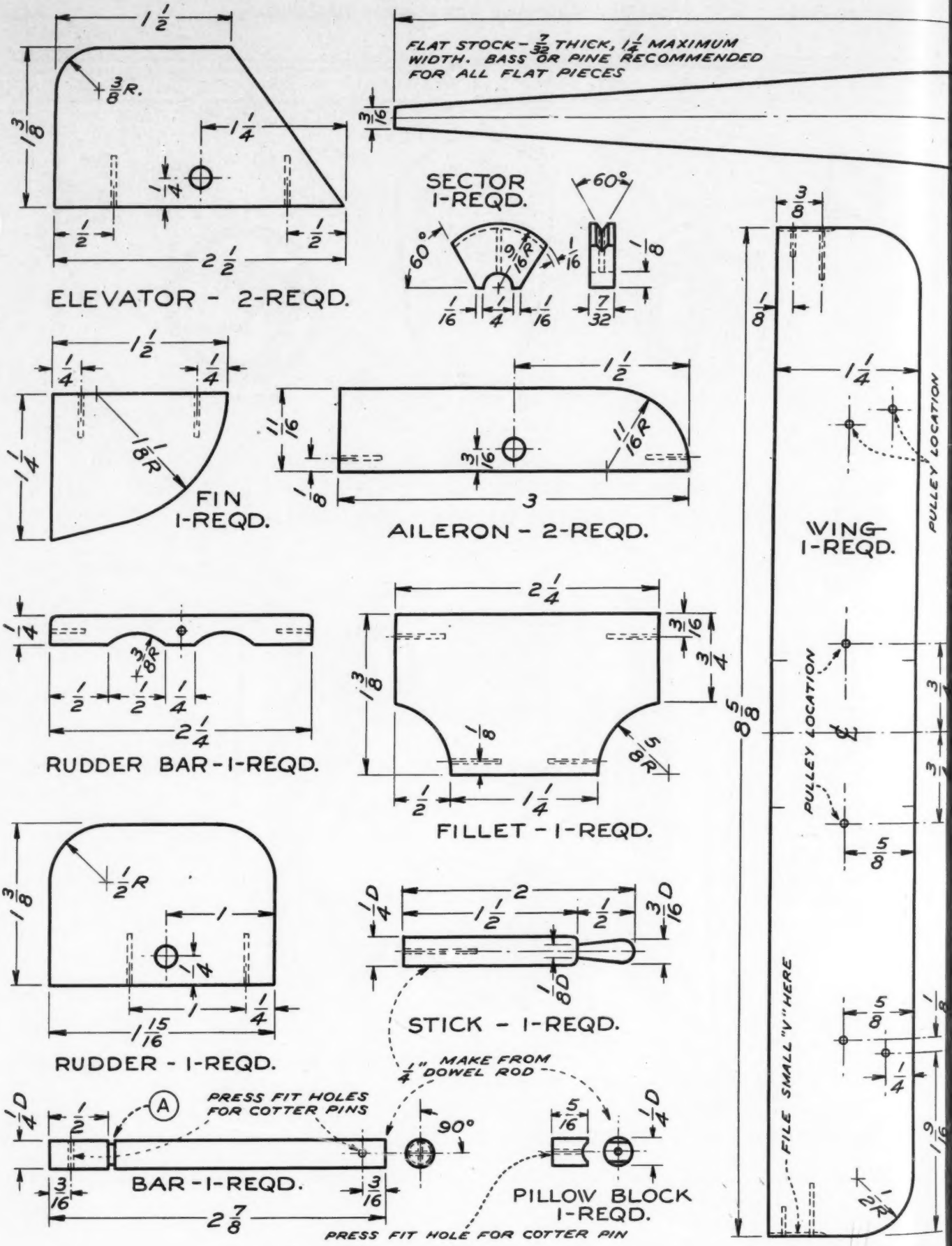
BOOK END



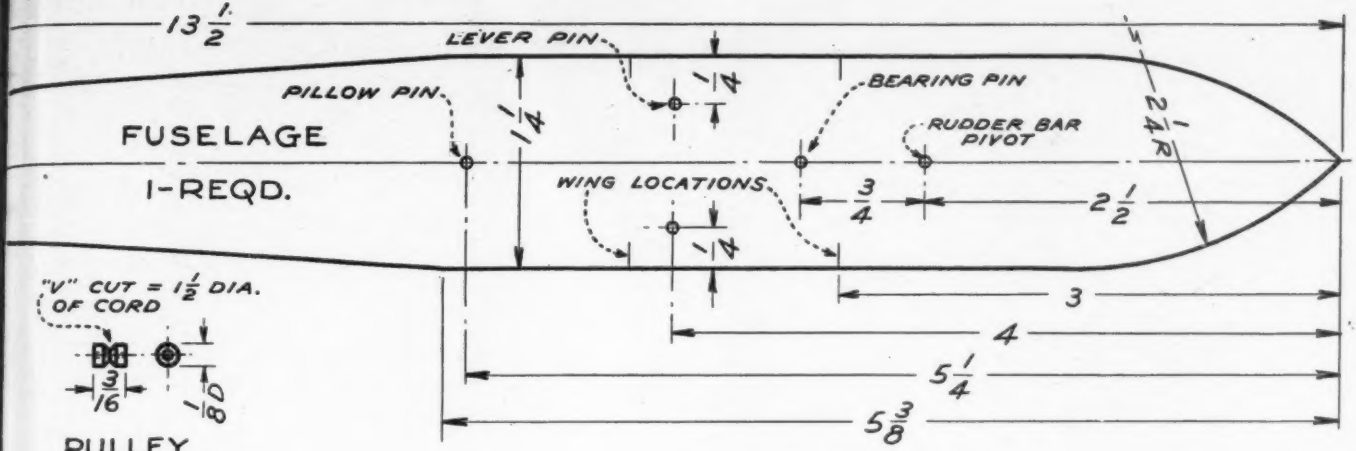
CHANGE OF OUTSIDE SHAPE OF BASIC FORM IS CONTOUR ENRICHMENT · THE DESIGN MAY INFLUENCE THE CONTOUR OR VICE VERSA

AN INTERESTING CUTTING OF SPACE IS OUR OBJECTIVE · THE INTERSTICES ARE AS IMPORTANT AS THE DESIGN FORMS · DESIGN IS ORDERLY ARRANGMENT

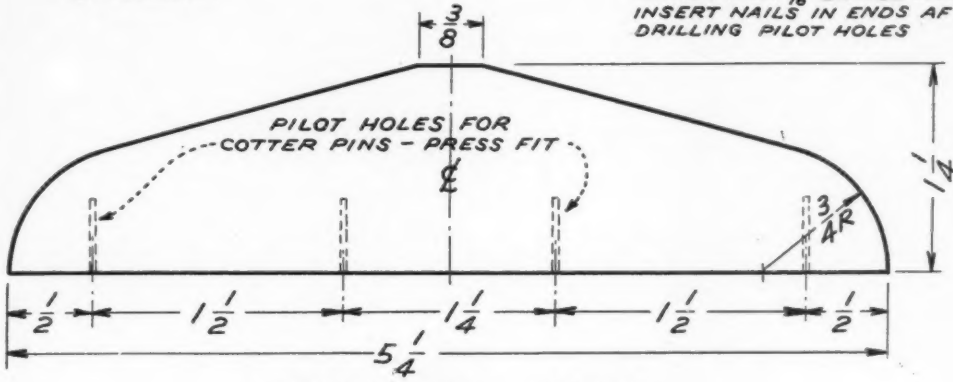
Plate 4. Creative design course by Richard E. Bailey, chairman, art department, Central High School, Providence, R. I.


FLAT STOCK - 7/32 THICK, 1 1/4 MAXIMUM WIDTH. BASS OR PINE RECOMMENDED FOR ALL FLAT PIECES
ELEVATOR - 2-REQD.
SECTOR 1-REQD.
FIN 1-REQD.
AILERON - 2-REQD.
WING 1-REQD.
PULLEY LOCATION
RUDDER BAR - 1-REQD.
FILLET - 1-REQD.
RUDDER - 1-REQD.
STICK - 1-REQD.
MAKE FROM 1/4" DOWEL ROD
PRESS FIT HOLES FOR COTTER PINS
BAR - 1-REQD.
PILLOW BLOCK 1-REQD.
PRESS FIT HOLE FOR COTTER PIN
FILE SMALL "V" HERE

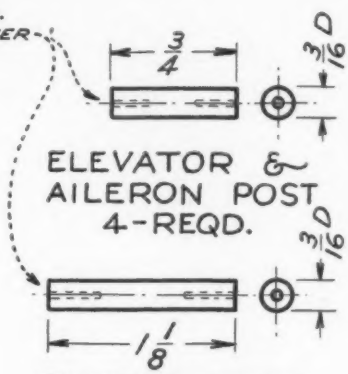
Airplane — control details (Continued from

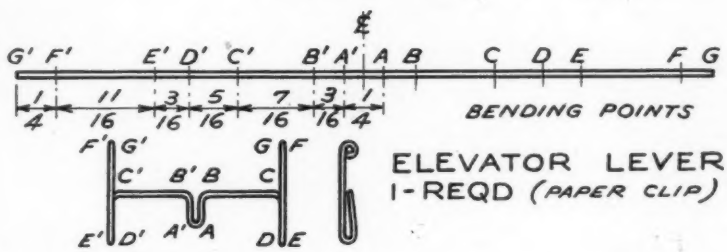


PULLEY
8-REQD.



STABILIZER - 1-REQD.





ELEVATOR LEVER
1-REQD (PAPER CLIP)

STAPLE
2-REQD.
(COMMON PIN)

AILERON HINGE
2-REQD.

LINK - 1-REQD.
(PAPER CLIP)

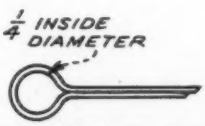
LINK PIN
1-REQD.

FILLET HINGE
2-REQD.

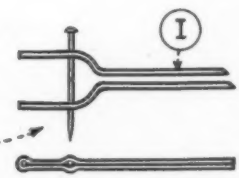
COTTOR PIN
ABT. 24-REQD.

STANDARD 1 1/2 x 1/16 FOR HINGES & BEARINGS

PILLOW PIN
1-REQD.

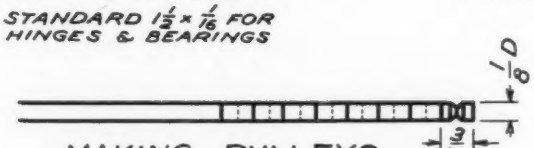


BEARING PIN
1-REQD.



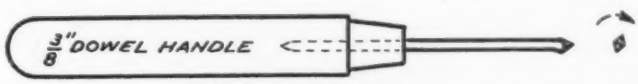
SADDLE PINS
2-REQD.

FORM TWO COTTER PINS AS SHOWN. PLACE TOGETHER AT (I) AND PUSH INTO CONTROL STICK



MAKING PULLEYS

SCORE PULLEYS WITH KNIFE, FILE V'S, CUT OFF, DRILL SEPARATELY FROM BOTH ENDS.



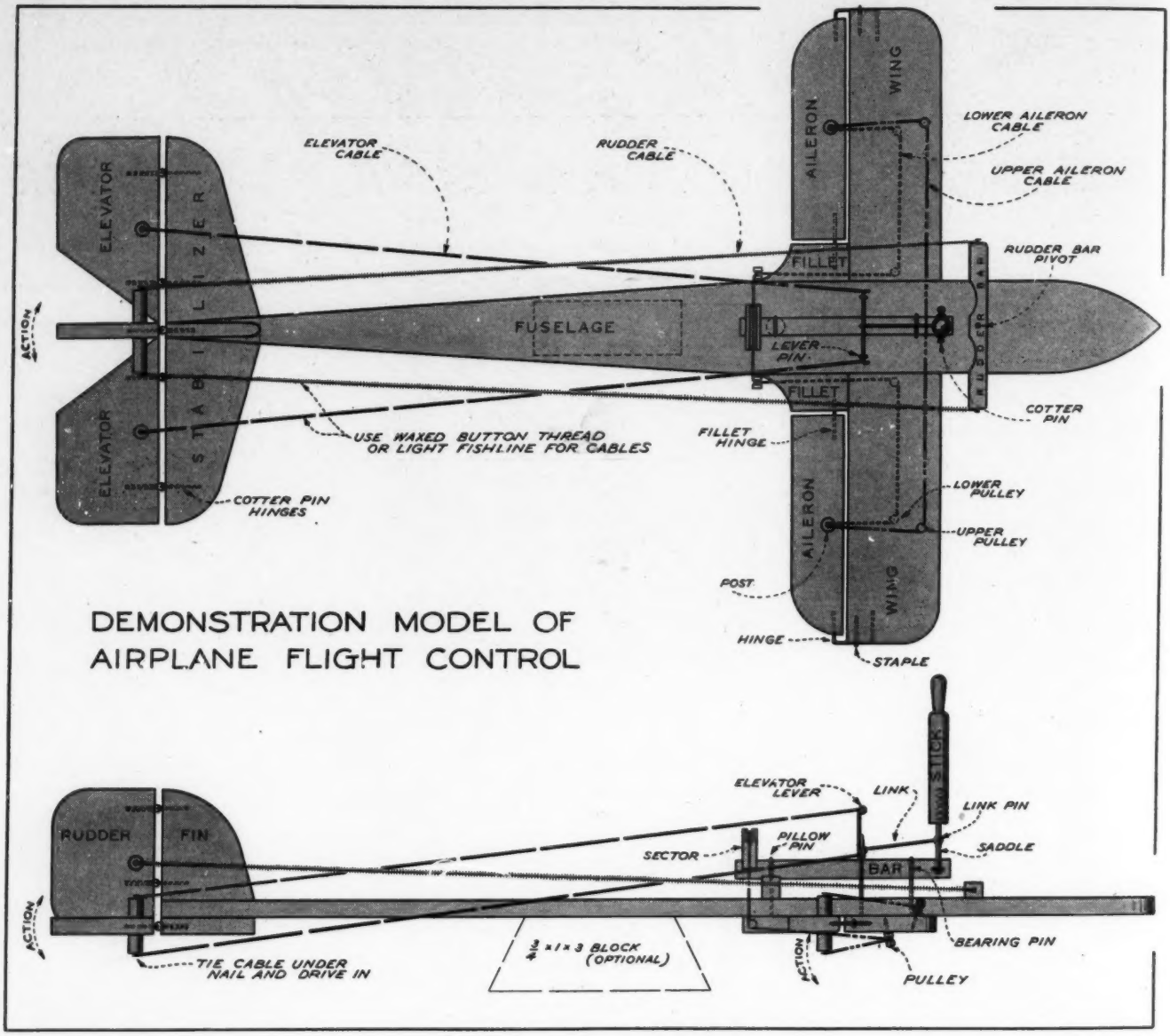
HANDY AWL

MAKE OF NAIL, FILE END AS SHOWN - MAKE SEVERAL SIZES.

NOTE:-

DRILL ALL HOLES PRESS FIT (EXCEPT PULLEYS) TO PREVENT LOST MOTION, ESPECIALLY IN BAR. LABEL CONTROL SURFACES. FINISH WITH CLEAR COATING. STRETCH CORDS TIGHTLY. ASSEMBLE AILERON CORDS FIRST.

page 441). See also next page for assembly



Airplane — control assembly

(Continued from page 441)

and the pulleys well centered and free moving to prevent wear on the cords.

To operate the model, a push of the stick forward depresses the elevators, and the plane would nose down or dive. A pull back on the stick reverses the elevators and the plane would climb. To make a turn, ease the control stick to the left or right, simultaneously with the rudder. This raises one aileron and lowers the opposite one to provide a twist or bank in the direction of the turn.

The four-way motion of the stick and the two-way travel of the rudder bar, make possible the varied combinations which result in aerial acrobatics.

Since the best things in life are free, a good book to accompany the model is, *Its Easy to Fly*, published by the Standard Oil Co. of New York, 26 Broadway, New York City.

Shop safety is dependent to a great extent on two factors. One is shop conditions and the other is effectiveness of instruction. — *Roy R. Van Duzee*

Personal News

DEATH OF A. H. WHITESITT

Andrew H. Whitesitt, professor of industrial education, Kansas State Teachers College, Pittsburg, died suddenly at his home, following a heart attack, on Monday afternoon, October 5, 1942. He had been in good health recently, and taught his classes as usual on Monday. About four o'clock he walked to his home, two blocks from the campus, and sat down to read the paper when apparently he became ill without warning. A neighbor in the adjoining apartment summoned a physician, but little could be done. Death came a few minutes before five o'clock.

Mr. Whitestt was born May 13, 1874, in Morgan County, Ind. After teaching the common branches in a number of rural and village schools in Indiana for nine years, he enrolled in the State Teachers College, Terre Haute, Ind., where he received the life diploma in 1908. From 1908 to 1911, he was director of industrial arts in East Chicago, Ind. Then for two years he was instructor of cabinetmaking in Emmerich Manual

Andrew H. Whitesitt

Training High School, Indianapolis. In 1913 he went to Kansas State Teachers College, Pittsburg, as head of the woodworking department, and in

(Continued on page 18A)

HOW AND WHY

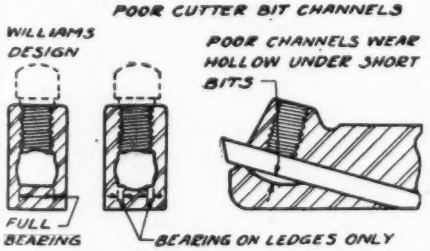
WILLIAMS' TOOLS AID WAR PRODUCTION

J. H. WILLIAMS & CO., *Drop-Forgings and Drop-Forged Tools*, BUFFALO, N. Y.

DATA ON WILLIAMS' TURNING-TOOLS

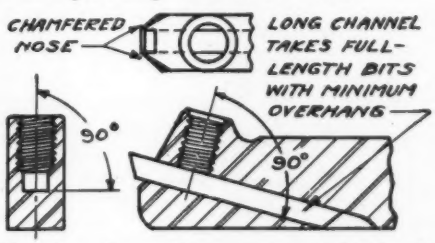
Since metal turning constitutes a major operation in our war production program, consideration of available tools for this purpose is timely. The Tool Holder system offers definite advantages over solid, forged tools for lathe, planer, shaper, etc. Greater convenience, efficiency and economy result with the use of properly designed Tool Holders, which save practically all waste of costly high speed steel, eliminate all dead stock of heavy forged tools, do away with all blacksmith labor and much grinding, and reduce lost man and machine hours waiting for tools substantially to zero.

Tool Holders, however, to satisfactorily replace solid forged tools, must be engineered to withstand the severe treatment which modern metal turning imposes on the cutting tool. Williams' Holders are drop-forged from a specially selected grade of steel, treated and hardened to develop maximum resistance to all wear and insure a hard rigid seat for the cutter directly under the holding or locking device. This tends to prevent cutter breakage which is due largely to the recess or pocket formed by short bits being forced into the cutter seat of the holder when the shank has not been properly hardened.



The bottom face of the shank of all Williams' Holders is rechecked after heat treating to insure a flat, square surface for the holder to rest on.

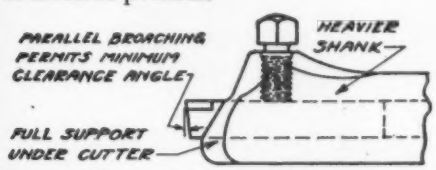
In Williams' Turning Tool Holders the nose is chamfered to permit convenient use in close quarters where space is limited. Set Screws are located at exact right angles to the cutter bit channel to provide full contact of the point of the screw with the cutter bit and insure maximum holding power. Screws and tapped holes are held to the close fits essential for long life under gruelling tool holder service.



Sketches above illustrate a straight shank Williams' Turning Tool Holder. Note that the extremely long cutter bit channel extends thru the bottom face of the shank, providing maximum entry for the cutter bit. This feature assures minimum overhang when a *full-length* bit is used, thus reducing the danger of cutter bit breakage.

Carbide Turning-Tool Holders

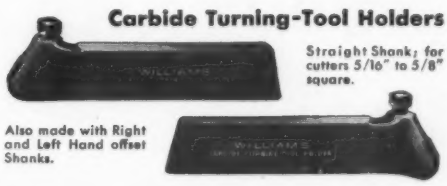
Since tungsten carbide cutters approach a diamond in hardness (88-92 Rockwell A), the brittle nature of this material makes it absolutely essential that the cutter bit be held rigid and the cutting edge supported as much as possible.



To provide a rigid tool and assure maximum support of the cutter, the shanks of Williams' Carbide Holders are made heavier and longer than regular Turning-Tool Holders of equal cutter capacity. The cutter channel is broached parallel with the base of the shank rather than at the usual 15° angle. The parallel broaching of the cutter slot permits proper grinding of the cutter so as to give maximum support to the cutting edge.

Regular Turning-Tool Holders

Carbide Turning-Tool Holders



WILLIAMS
SUPERIOR DROP-FORGED TOOLS
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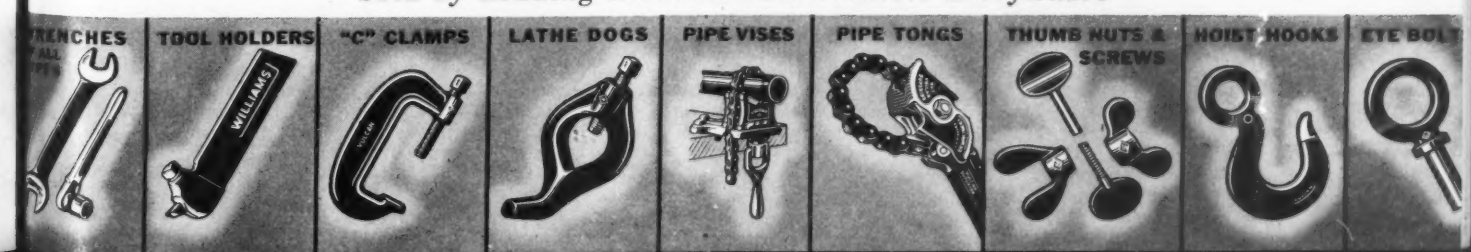
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere



YOUR STUDENTS
Need this HOW-TO-DO-IT Manual

Partial list of KNOW-HOW information

- How to Read Working Drawings
- How to Make Precision Measurements
- How to Transfer Measurements
- How to Read a Micrometer
- How to Read a Vernier
- What the Beginner Needs to Know About Fits, Tolerances, Bench Work, Filing, Metal Sawing, Drilling, Grinding, etc.
- How to Select Grinding Wheels
- How to Set Up Machinery
- How to Use Mensuration Data, Mechanics, Mathematical Short Cuts

184 PAGES
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30 REFERENCE TABLES

This new Starrett Book contains the kind of practical, useful, up-to-the-minute information about tools, machines and modern metal working methods your boys must know today. It will save you much time and many a headache in your vitally important job of teaching your boys the value of fine precision tools and the correct methods of using them.

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ATHOL MASSACHUSETTS U. S. A.

STARRETT TOOLS

(Continued from page 448)

1918 was promoted to the position of director of the industrial-education department, which he held until 1935. In that year he asked to be relieved of responsibility as head of the department, and was succeeded in that capacity by Dr. William T. Bawden. Professor Whitesitt continued as a member of the staff of the department, teaching classes in woodwork, drafting, and methods.

Coming to Pittsburg in 1913, it was his good fortune to see the development of the former State Manual Training Normal School, with a two-year diploma curriculum, into the Kansas State Teachers College, offering four-year curriculums leading to both A.B. and B.S. degrees, and a fifth year of graduate work leading to the M.S. degree. During this period the industrial-education department of the college attained nationwide recognition for the high quality of work accomplished, and its graduates were called to all parts of the country.

After his appointment at Kansas State Teachers College, he completed summer school work at Bradley Polytechnic Institute, Peoria, Ill., and at The Stout Institute, Menomonie, Wis. In the summer of 1917 he received the B.S. degree from Kansas State Teachers College, and in 1928 the M.A. degree from Teachers College, Columbia University, New York. His practical trade experience included carpentry and cabinetmaking.

Of all the members of the College faculty who were serving at the time of Professor Whitesitt's appointment in 1913, only three are still active: Dr. O. P. Dellinger, dean of the College and of the Graduate School; Professor J. A. G. Shirk, head of the Department of Mathematics; and Miss Odella Nation, Librarian. Two others, retired from active duty, are still living in Pittsburg: G. W. Trout, former Dean of the College; and Miss Eulalia Roseberry, former head of the Department of Geography.

Mr. Whitesitt is survived by his widow, Mrs. Ada Whitesitt; two sons, Ermal K., instructor of printing, East High School, Wichita, Kans., and Robert K., Pullman conductor, with headquarters in St. Louis, Mo.; one brother, Ritter Whitesitt, industrial-arts instructor, St. Louis; and four grandchildren.

He was an active member of the National Education Association, American Vocational Association, Kansas State Teachers Association, Kansas Industrial Arts Association (serving as president two terms), and Kansas Vocational Association. For a short period he was a member of the Manual Arts Conference of the Mississippi Valley. He was elected to membership in Phi Delta Kappa, honorary educational fraternity, at Columbia University, and was a member of the American Association of University Professors. He was an active member of the Christian Church, and a member of the board of elders of the Pittsburg Church.

CLINTON S. VAN DEUSEN RETIRES

Clinton S. Van Deusen, head of the department of industrial arts at Kent State University, Kent, Ohio, has retired at the age of 71 years.

Professor Van Deusen was born at Newark, N. Y., October 1, 1871. He attended the elementary and secondary schools of that city. In 1894 he was graduated as an electrical engineer from Cornell University, and in 1933 received the M.A. degree from Western Reserve University.

Clinton S. Van Deusen

He was always active in the advancement of his profession and held many offices in the educational organizations to which he belonged. Thus he was a charter member of the Illinois Manual Arts Association, and attended the meetings of the Mississippi Valley Manual Arts Conference since the very beginning. He was also active in the Western Arts Association for many years.

He is the author of several books and also contributed to the professional magazines in his field.

Students and hundreds of teachers in the fields of industrial arts and vocational education will sorely miss this kindly man, now that Professor Van Deusen has retired to private life.

BARICH HEADS INDUSTRIAL-ARTS DEPARTMENT

Dewey F. Barich, who was state supervisor of the Michigan State Board of Control for Vocational Education for the past two years, has been appointed head of the industrial-arts de-

Dewey F. Barich

(Continued on page 20A)

Important notice to MANUAL TRAINING INSTRUCTORS . . .

Local Hardware Dealers will supply your students with the Disston Saw, Tool and File Manual FREE!

Here is a valuable aid to instruction that your boys can get for the asking at local hardware stores. Advise them to get the free Disston Saw, Tool and File Manual to help them in workshop practice—to teach them the proper choice, use and care of good tools -to speed their training and simplify your work of supervision.

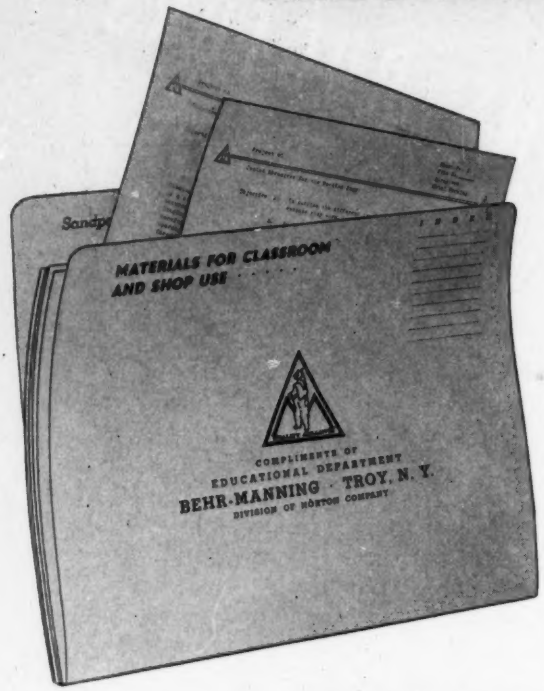
The Disston Manual is a simple, practical book, easy to read and understand. Plain instructions and many helpful illustrations will win the approval of students of all ages. There is plenty of material in this valuable book to provide the inspiration and incentive that lead to fine craftsmanship.

The hardware dealers in your community are providing the Disston Tool Manual without charge as their part in the nationwide Disston Conservation Control Plan to help save tools and essential materials, and lengthen the life of equipment, to aid war production.

Disston also supplies free educational charts and other material for classroom and workshop use. Have your students get the Disston Tool Manual from hardware dealers—and write today about the other free material.

HENRY DISSTON & SONS, INC.
1238 Tacony, Philadelphia, Pa., U. S. A.

VALUABLE TEACHING AIDS for This Semester



The first unit of a series of Practical Instruction Sheets—Projects on Metalworking Abrasive Cloth and Oilstones—has just been released for Classroom and Shop use during the 1942-43 school year. A special file folder has also been provided for your convenience.

We have developed this plan as a result of many requests for brief, concise, and basic information on sandpaper and oilstones and their application in industry. The aim of our Educational Department is to help you make better mechanics of today's students. To this end our services are at your disposal.

If you have not received this first unit, a postcard to our Educational Department will bring it post-haste.

BEHR-MANNING (DIVISION OF NORTON COMPANY) **TROY, N. Y.**

(Continued from page 18A)

partment of Kent State University, Kent, Ohio.

In his new position, he succeeds Professor Clinton S. Van Deusen, who retired recently after having been head of the industrial-arts department for many years.

♦ ERNEST G. ARNOLD from Orlando, Okla., LONNIE GILLILAND from Chickasha, Okla., J. B. STEPHENSON from Choctaw, Okla., B. A. SWAGERTY from El Reno, Okla., and E. E. WALKER from Enid, Okla., have now been added to the faculty of the industrial-arts department of the city schools, Oklahoma City, Okla.

♦ SECOND LIEUTENANT JAMES GARFIELD SOLBERG, student at The Stout Institute from 1936 to 1938, received his commission in the U. S. Army Air Force at the Lubbock Army Flying School, Lubbock, Tex.

♦ NORMAN ERCKMAN, formerly teaching at Tech. High, Atlanta, Ga., has been appointed instructor at the Lincoln High School, Ferndale, Mich.

♦ ARVID STUBBS has been appointed supervisor of the new vocational school at Ashland, Wis.

♦ ROBERT O. JOHNSON of Menomonie, Wis., who received his B.S. degree from The Stout Institute, is now a naval cadet.

♦ JAMES BRESSLER, formerly at La Salle, Ill., has been appointed to a teaching position at the U. S. Navy Training Center, Chicago, Ill.

♦ HAL GILKER, formerly director of industrial education of the East Independent School District in Waterloo, Iowa, has joined the teacher-trainer staff under Col. Fryklund at the Armored Force School, Fort Knox, Ky.

♦ DAVEY E. CARLSEN, formerly instructor of printing at the Miller Vocational School, Minneapolis, Minn., has been appointed instructor of the same subject at The Stout Institute, Menomonie, Wis.

♦ FLOYD KEITH, who has been in charge of training at the Navy Center, Navy Pier, Chicago, Ill., for the past year, has returned to The Stout Institute, Menomonie, Wis., to resume his position as instructor of general metals.

♦ W. B. ASHLEY, formerly printing instructor at the Maine Township High School, Des Plaines, Ill., has now joined the army.

♦ HAROLD BROWMAN, formerly machine-shop instructor at the Maine Township High School, Des Plaines, Ill., has enlisted in the navy and is now at Great Lakes.

♦ HAROLD RICHARDSON has been appointed machine-shop instructor at the Lyon's School, La Grange. Ill.

♦ MILFERD HANSON has been appointed machine-shop instructor at the Maine Township High School, Des Plaines, Ill.

♦ J. C. PENDLETON. formerly at the Senior High School, Joliet, Ill., has been chosen to teach radio and electricity at the Maine Township High School, Des Plaines, Ill.

♦ NORMAN CROUCH, formerly at the Central High School, St. Joseph, Mo., has joined the faculty of the Maine Township High School, Des Plaines, Ill., as teacher of printing.

♦ The Stout Institute, Menomonie, Wis., announces the following placements for the 1942 graduates of the industrial-arts division:

NORMAN CARLSON, defense industry, Lake Delton, Wis.
LAWRENCE CLARKE, U. S. Naval Reserves.
TONY DECHIARA, U. S. Naval Reserves.
ADRIAN DORSCH, Curtiss-Wright Aircraft Corp., Columbus, Ohio.
VERNON FEILER, U. S. Naval Reserves.
ALVIN FRITZ, U. S. Naval Reserves.
WILLIAM FUNK, U. S. Army Reserves.
EVERETT HASSE, U. S. Army Air Corps.
JAMES HILL, U. S. Army.
CLARENCE JOHNSON, U. S. Army.
ALTON LARSON U. S. Army.
EARL METTEL, Chicago Vocational School, Chicago, Ill.
KEITH MOON, U. S. Naval Reserves.
JOHN RICHTER, U. S. Navy.
LESLIE SMITH, Emanuel Missionary College, Berien Springs, Mich.
CHARLES STEBER, U. S. Army.
CARL STORI, U. S. Army.
JAMES STRIEBEL, Chicago Vocational School, Chicago, Ill.
LLOYD WEBERT, U. S. Army Air Corps.
BERNARD U. ZIESMER, U. S. Army.
GLEN W. CHRISTIANSON, Army Radio School, Chicago, Ill.
JOHN J. GUNDERSON, Hermantown Schools, Duluth, Minn.
GERALD B. HAWKINSON, U. S. Naval Reserves.
CHARLES R. HILL, U. S. Navy.
EDWIN HOWE, U. S. Army.
LYLE LANDRUM, U. S. Naval Reserves.
JAMES F. PETERMAN, U. S. Navy, Navy Pier.
EUGENE H. WERELEY, U. S. Army.
JOHN HUB, U. S. Naval Reserves.
JOHN MILBRATH, U. S. Airlines, St. Paul, Minn.
WILLIAM GEORGE PATTERSON, State Board of Vocational Education, Hales Corners, Wis.

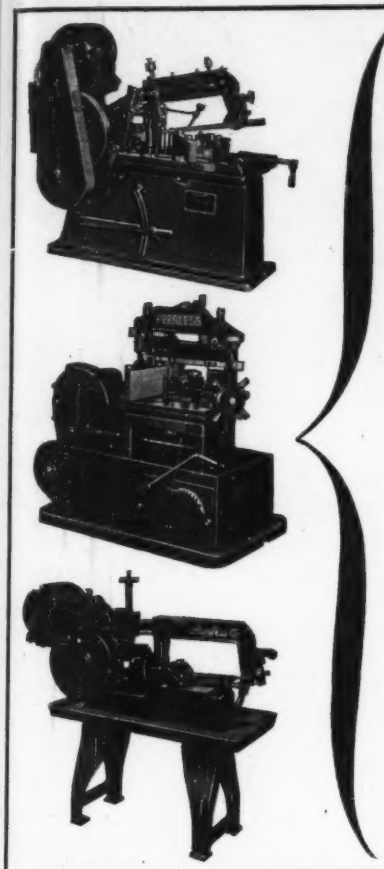
Association News

A.V.A. CONVENTION

The program set up for the A.V.A. convention to be held at Toledo, Ohio, contains real up-to-the-minute material for those teaching industrial-arts and vocational-education subjects. This convention is of especial importance this year since the school shops are overloaded with a real job to do in training war-production workers. Comparing one's work with others can be productive of much good.

The industrial-education section starts its meetings at a joint luncheon held in conjunction with

(Continued on page 23A)



TRAIN WITH PEERLESS METAL CUTTING POWER SAWS . . . THE TOOLS WAR INDUSTRIES USE!

● In teaching the best methods of high speed, accurate metal cutting, industrial arts directors know the value of modern tools—the power saws war industries use in maintaining their peak production schedules.

Peerless Saws, because of their faster action, safety features, accurate cutting and operating economy—have replaced wasteful, more costly methods on wartime's faster-moving production lines.

Such features as Peerless hydraulic control, including length gauging on the automatic types, and the patented Four-Sided Saw-Frame and Backing-Plate Blade Support have set a new standard for power sawing.

There are four bulletins covering the broad Peerless Line—Bulletin 50-A on High Duty Hydraulic types . . . Bulletin 53 on Heavy Duty Hydraulic Saws for die-block work . . . Bulletin 51-A for Universal types with mechanical control . . . and Bulletin 52 covers Standard Models for general utility cutting.

All bulletins sent free on request to Dept. J.

PEERLESS MACHINE COMPANY, RACINE, WIS.

(Continued from page 20A)

The National Association of Industrial Teacher Trainers, at 2:30 p.m. Wednesday, December 2. At this meeting Lynn A. Emerson, president, The National Association of Industrial Teacher Trainers; and professor of industrial education, Cornell University, Ithaca, N. Y., will be chairman. The speakers, Gabriel Rousseau, general director, Des Ecoles D'Arts et Metiers, Montreal, Quebec, and Lieutenant Colonel Verne C. Fryklund, director, Teacher Training Department, Armored Force School, Fort Knox, Ky., will speak on *Training for War Industries and the Armed Forces in the Province of Quebec* and *The Training Program of the Armored Force School,* respectively.

The chairman for the afternoon session will be Robert D. Dolley, state supervisor of Trade and Industrial Education, Tallahassee, Fla., and L. S. Hawkins, director, Vocational Training for War-Production Workers, U. S. Office of Education, Washington, D. C., will speak on *Improvement of Instruction in War-Production Worker Training.* John C. Beswick, state director of Vocational Training for War-Production Workers, Sacramento, Calif., will lead in the discussion.

The National Association of Industrial Teacher Trainers will hold their first session at 9:30 a.m. on Wednesday. Clyde H. Wilson, professor of Industrial Education, University of Tennessee, Knoxville, Tenn., will be chairman of the meeting. Anthony M. Goldberger, director of Vocational Teacher Education, University of Pittsburgh, Pittsburgh, Pa., is the main speaker and he will present *A Proposed Program of Research for Industrial Teacher Trainers.*

This section will hold a joint luncheon meeting with the National Association of State Supervisors of Trade and Industrial Education.

At the Wednesday afternoon session, at which C. L. Wetzel, Vocational Teacher Trainer, St. Louis Public Schools, St. Louis, Mo., will preside, William F. Rasche, director, Milwaukee Vocational School, Milwaukee, Wis., will speak on *The Teacher Training Program of the Milwaukee Vocational School.* T. A. Hippaka, professor of Industrial Education, Iowa State College, Ames, Iowa, will discuss *Industrial-Arts Teacher Training in Iowa Under War Conditions,* and A. D. Althouse, supervisor of Vocational Education, Detroit Public Schools, Detroit, Mich., will speak on *Teacher Training for War Industries in Detroit.*

Training for the Aviation Industry will be the subject of discussion on Thursday morning. Laurence Parker, state supervisor of Trade and Industrial Education, Topeka, Kans., is the chairman of this meeting. John C. Beswick, state director of Vocational Training for War-Production Workers, Sacramento, Calif., J. C. Woodin, supervisor of Training for War-Production Workers, Wichita, Kans., Charles W. Sylvester, director of vocational education, Baltimore, Md., F. E. Searle, superintendent of Ford Schools, Dearborn, Mich., Mark Brooks, state director of Vocational Training for War-Production Workers, Jefferson City, Mo., James R. D. Eddy, state director of Industrial Education, Austin, Tex., and Michael Steffen, Aviation Consultant, U. S. Office of Education, Washington, D. C., will be the speakers.

There will also be sessions on *Finance and Accounting Procedures in the Program of Vocational Training for War-Production Workers; Training for Public Service Occupations; Labor and Industrial Relations; Training Within Industry; Training of Women for Industry; Operating Training Courses for Civilian Personnel for the Military Forces;* and *Diversified Cooperative Training.*

On Friday, the subjects for discussion will be *The Long-Term Industrial Education Program; Training for the Shipbuilding Industry; The Apprenticeship Program;* and *The Industrial Trainers Association.*

On Saturday there will be a symposium on vocational industrial education for the postwar period. Besides this there will be a number of sectional round-table discussions.

The industrial-arts section meeting on Thursday morning will be under the chairmanship of Dr. Lawrence F. Ashley, Chief, Division of Vocational Education, Board of Education, Yonkers, N. Y.

Dr. Fred J. Schmidt, Jr., Associate Professor of Industrial Arts, Ball State Teachers College, Muncie, Ind., will speak on *Some Factors in the Growth and Achievement of Industrial-Arts Teachers.*

Dr. Ralph Swetman, president of State Teachers College, Oswego, N. Y., will discuss *The Point of View As a Factor in the Growth and Achievement of Industrial-Arts Teachers.*

Professional Development As a Factor in the Growth and Achievement of Industrial-Arts Teachers is the topic on which Dr. Charles M. Herlihy, president of State Teachers College, Fitchburg, Mass., will speak; and professor Harold Silvius, Wayne University, Detroit, Mich., will summarize the addresses.

Dr. T. A. Hippaka, Professor of Industrial Education, Iowa State College, Ames, Iowa, will be chairman at the afternoon session at which time Dean Clyde Bowman, Stout Institute, Menomonie, Wis., will give an address on *The Preparation of Industrial-Arts Teachers for the Small School;* and Mr. Roy Van Duzee, director, West Allis School of Vocational and Adult Education, West Allis, Wis., will speak on *The Industrial-Arts Offerings in the Small High School.*

The Friday afternoon session will be presided over by Mr. George H. Hargitt, supervisor of Industrial Arts, St. Louis, Mo. The speakers are Mr. Verne L. Pickens, supervisor of Practical Arts Education, Kansas City, Mo.; Mr. Dean Schweickhard, assistant superintendent of schools in charge of industrial arts, Minneapolis, Minn.; and Professor Emanuel E. Ericson, director, Divi-

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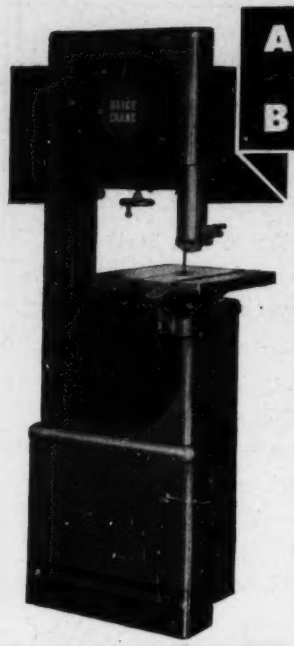

A.V.A.—WELCOME TO TOLEDO
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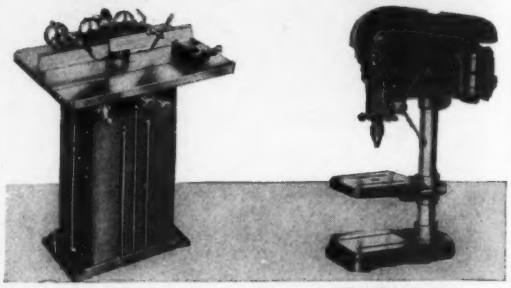

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(Continued from previous page)

sion of Industrial Education, Santa Barbara State Teachers College, Santa Barbara, Calif. They will discuss *Industrial Arts in the Postwar Era,* from the viewpoints of the supervisor, the general administrator, and the teacher trainer.

Dr. William T. Bawden, head of Department of Industrial Education, Kansas State Teachers College, Pittsburg, Kans., will be the chairman, and Mr. George F. Weber, director of Industrial Education in the City Schools, and Director of Vocational Training for National Defense, South Bend, Ind.; Dean Albert F. Siepert, Dean of Education, Bradley Polytechnic Institute, Peoria, Ill.; and Dr. Maris M. Proffitt, educational consultant and specialist in Industrial Education, U. S. Office of Education, Washington, D. C., will discuss trends and relationships of industrial arts.

Professor Thomas Diamond, professor of Vocational Education, University of Michigan, Ann Arbor, Mich., will be chairman at the Saturday noon luncheon, and Mr. Charles E. Swartzbaugh, president of the Chamber of Commerce, Toledo, Ohio, the toastmaster.

The Reverend Russell J. Humbart, Toledo, Ohio, and Mr. Frank Moore, directing supervisor of Industrial Arts, Cleveland, Ohio, will be the speakers.

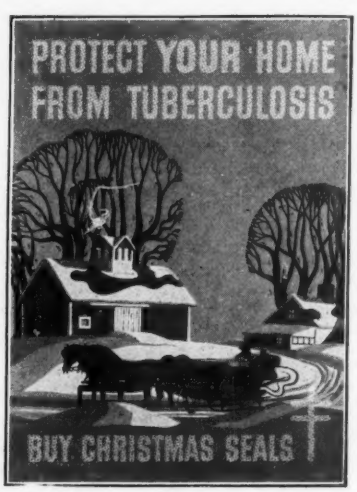
♦ The Psi Chapter of Epsilon Pi Tau, the National Honorary Industrial-Arts Fraternity, held its first meeting for the fiscal year 1942–43. This was followed by an informal dinner, held in the Georgian Room, State Teachers College, California, Pa.

The business of the evening opened with the election of new officers, and was followed by a discussion of the program for the current year. The newly elected officers are: president, Alexander R. Smoyer of Clairton, Pa.; and secretary-treasurer, John Labeka of Monessen, Pa.

Those in attendance were Dr. Shriver L. Coover, director of industrial arts, State Teachers College, California, Pa.; Mr. Anthony T. Stavaski, faculty sponsor; Mr. Robert M. Keck; Mr. William Cole; Mr. Levan Hill; Mr. Alexander Smoyer; Mr. John Labeka; Mr. Jacob Scheopler; and John Darney.

— *Alexander R. Smoyer,* President

♦ The Fifteenth National Exposition of Power and Mechanical Engineering will be held from November 30 to December 4, inclusive. The exposition opens Monday at 2 p.m., and daily thereafter at 11 a.m. It closes daily at 10 p.m., except Friday, when the closing hour will be 6 p.m. The exposition, which has been recognized for twenty years as a national market for the newest products of research and invention in power and mechanical engineering, will be held at Madison Square Garden, New York City. This year it has been organized for the special purpose of contributing to war production, information, and the mental resources needed to increase power production, and to use it most efficiently. The display by manufacturers will consist of power-plant equipment, hand and portable electric tools, contour machines, electric markers and etchers, electric soldering tools, blowtorches, forges, electric rivet heaters, gas and electric welders, millers, shapers, band saws, saw grinders, and woodworking machinery.



♦ At a meeting of the executive committee it was voted, that due to the present emergency, the meetings of the Massachusetts Industrial Education Society be curtailed to a minimum. The regular October meeting was canceled in favor of the New England Industrial Arts Meeting in Worcester, November 6 and 7.

The annual get-together will be held January 30, 1943, and will probably be at the Hotel Lenox as usual. The only other meeting will be held sometime early in spring. The Fitchburg meeting last year was such a grand success that it was decided to try to hold another every second year.

The society will keep in regular touch with its members by mail.

— *Otis W. Leary,* Press Representative

News Notes

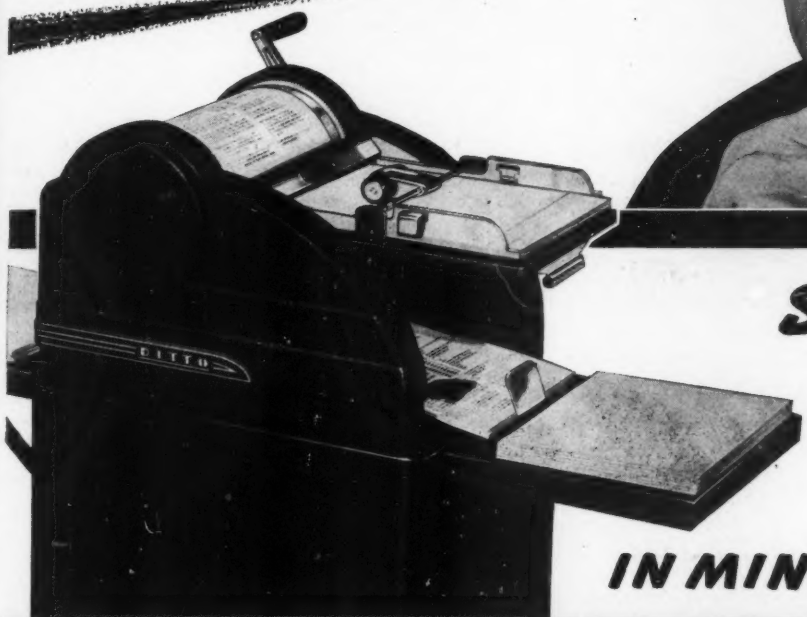
ANNUAL HIGGINS MEMORIAL CONTEST

For the fourteenth consecutive year the Higgins Ink Co., Inc., is sponsoring the annual Higgins memorial drawing ink section of the National Scholastic awards. Six million high school students are eligible for this contest. One million eight hundred thousand of them in 42,500 classrooms in 14,700 schools will learn about the contest while using *Scholastic* magazine in their

(Continued on page 26A)

YOU THINK IT UP—

DITTO MAKES IT HAPPEN!



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Ditto instantly makes copies of anything written, printed or drawn—in one to five colors at once, all at the same quick turn of the handle. No type, stencil, ink or carbon needed!

Why bother with slow, cumbersome methods? Why hold up instructions for precious days when you can have copies of anything in minutes? The war industries have turned to Ditto; why not you?

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Beyond that, let students learn to use Ditto machines. They'll then be useful in any business. Send to us for samples of forms used daily in business. These forms open students' eyes to the larger aspects of business—accounting, credit, payroll, sales, finance. Thus Ditto becomes not only a job but inspiration for a career. Get these forms, write for new teaching-idea literature!

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(Continued from page 24A)

lesson plans. Fourteen thousand two hundred fifty supervisors of art and mechanical drawing will personally receive contest data from the company.

The theme for the mechanical drawing section of the contest has been so chosen that all projects will aid in the preindustrial training of high school students.

All entries must be received by March 25, 1943. For further information write to the Higgins Ink Co., Inc., 271 Ninth St., Brooklyn, N. Y., or to Scholastic Awards, Chamber of Commerce Bldg., Pittsburgh, Pa.

♦ Two public high schools at Racine, Wis., will begin training junior and senior girls for employment in war industries, W. C. Giese, superintendent of schools, announces. The board of education has authorized the schools to offer shop classes for girls to be given Saturday mornings.

Classes will be offered from 8 to 12 a.m. each Saturday at both William Horlick and Washington Park High Schools. Instruction will be given in machine operation, blueprint reading, electricity, use of gauges, calipers and micrometers, shop safety and employee relationships.

The training program was worked out after a series of conferences between H. J. Shufelt, Supervisor of Industrial Arts, and personnel managers of Racine plants.

♦ The Vocational High School Teachers Association of New York City urge that students enrolled in the city's trade schools be permitted, "whenever practicable," to aid the war effort by actual production of war needed materials.

♦ Purdue engineering students can now do war-production work at the university. This institution has signed a subcontract with the Westinghouse Electric Co., and the students are now turning out machine parts.

♦ For the first time in its 97-year history, the New York State Teacher's Association met in "convention" by means of a special hookup of all CBS stations in the state Thursday, November 12. The unprecedented move was arranged to comply with wartime travel restrictions. (WABC—New York State network, 3:30 to 4:00 p.m., EWT.)

During the radio convention, thousands of teachers, parents and children were to gather round radios to hear Governor Herbert H. Lehman, Dr. George D. Stoddard, State Commissioner of Education, and Dr. John W. Dodd, president of the association, explain the vital role played by teachers in wartime.

The 48,000 teachers of the state were urged by the association to listen to the air convention and it is expected that 1,000,000 school children and 2,000,000 parents also heard the broadcast. Groups of teachers throughout the state are to meet locally to consider wartime teaching problems and further to discuss issues raised and dealt with on the program.

♦ Purchasing officers are now being sought by the government for positions which pay from $2,000 to $4,600 a year. They will prepare specifications for the purchase of government supplies; prepare invitations to bid; and maintain current information with respect to market trends, fluctuations, sources of supply, and laws and regulations pertaining to federal procurement.

The civil service examination announced for filling these positions calls for persons who have had from two to six years of responsible experience as purchasing or procurement officer handling large lots of materials of considerable variety. This experience may have been acquired with a large railroad, or other public utility, a large industrial or commercial establishment, a branch of the Federal Government or with the government of a state or large municipality.

In keeping with War Manpower Commission policy, individuals engaged in any production and maintenance occupations in nonferrous metal mining, milling, smelting and refining, and logging and lumbering industrials in the critical labor area which includes the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming, cannot be considered for appointment in the Federal Government unless a certificate of separation from the United States Employment Service has been obtained by the Civil Service Commission.

There are no age limits for this examination. No written tests are required. Applications will be accepted until the needs of the service have been met. Announcements and application forms may be obtained at any first- or second-class post office or from the Civil Service Commission, Washington, D. C.

♦ In recognition of their production achievements, the joint Army-Navy Production Award with Star has been presented to the South Bend Lathe Words. As announced by the management, this award is the third they have received this year. The previous awards were the Navy "E"—Ordnance Award and the All-Navy "E."

Bradley Group Wash Fixtures Protect Health — Save Critical Metals

Each of the eight to 10-persons washing simultaneously at a Bradley Circular Washfountain is furnished clean running water from the central sprayhead. The bowl made of precast stone is set low to permit thorough washing to the waist if desired. There is no collection of contaminating water, the bowl being self-flushing.

Installation is simplified since one 10-person washfountain requires only three piping connections — hot and cold water, and drain, while for 10 single wash basins 30 piping connections would be required. Space and water are saved too, automatic foot control cuts off the water supply immediately when not in use.

Central sprayhead of the Bradley gives each student clean running water. Ten can wash simultaneously.

Make Plans Now

Our "Picture Book of Installations" shows examples of how thousands of schools, colleges and industrial plants make use of Bradleys. Let us mail you a copy . . . BRADLEY WASHFOUNTAIN CO., 2269 W. Michigan Street, Milwaukee, Wisconsin.

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New Publications

A Dictionary of Technical Terms

By Frederic S. Crispin. Cloth, 373 pages, 5½ by 7⅞ in., illustrated. Price, $2.50. Published by The Bruce Publishing Co., Milwaukee, Wis.

This is the fourth edition of this popular and helpful dictionary. It has been considerably enlarged, and many new chemical, printing, electrical, steam heating, and riveting terms have been added.

New words referring to woodwork, plastics, concrete, and metals have also been defined and incorporated.

(Continued on page 29A)

(Continued from page 26A)

Aircraft Riveting

By Albert H. Nisita. Cloth, spiral binding, 160 pages, 8½ by 11 in., illustrated. Price, $2.50. Published by the McGraw-Hill Book Co., New York, N. Y.

Written by a man who has both practical and teaching experience, this book covers the identification of rivets, a knowledge of how to prepare the materials, and directions on the use and care of tools and equipment.

The book also contains a number of tables useful to the riveter.

Descriptive Geometry

By Ferdinand A. P. Fischer and James A. Clear. Cloth, 244 pages, 8½ by 11 in., illustrated. Price, $3. Published by The Bruce Publishing Co., Milwaukee, Wis.

This practical book on the space relationship of points, lines, planes, and solids which so frequently clamor for understanding and solution in engineering and architectural problems is presented in a thoroughly understandable way by men who have long taught drafting to engineers and engineering students.

A Career in Engineering

By Lowell O. Stewart. Paper, 48 pages, 6 by 9 in., illustrated. Published by Science Research Associates, Chicago, Ill.

One of the American Job Series booklets which will be found useful by students intending to take up engineering.

Flight

Aerial Navigation. Paper, 64 pages, 6 by 9 in., illustrated. Published by American Technical Society, Chicago, Ill.

This pamphlet on aerial navigation forms an introduction to the type of mathematics, geographical knowledge, and use of instruments needed for air navigation computations which will be required by more and more of our youths who will enter the air force both for the war and the postwar eras.

Oxyacetylene Welding

By M. S. Matteson. Paper, 64 pages, 8⅜ by 10¾ in., illustrated. Price, 72 cents. Published by The Bruce Publishing Co., Milwaukee, Wis.

A brief, thoroughly practical, yet complete course in gas welding for the beginner. It is written by a man who has had practical as well as teaching experience.

Electric Welding

By M. S. Matteson. Paper, 31 pages, 8¾ by 10¾ in., illustrated. Price, 40 cents. Published by The Bruce Publishing Co., Milwaukee, Wis.

A simple, straightforward statement of what the beginning arc welder must know before he can enter the industrial shop as a welder.

A Suggested Course of Study in Applied Textiles

Prepared by the State Education Department, Albany, N. Y. Paper, spiral binding, 240 pages, 8½ by 11 in., illustrated. Published by the New York State Vocational and Practical Arts Association. Copies of this book may be obtained by writing to Roy F. Johncox, Principal, Vocational High School, 2 Saratoga Ave., Rochester, N. Y. Price, $1.25 to members of the Association; $1.75 to nonmembers.

This is a two-year course developed by instructors from the Central High School of Needle Trades, under the direction of Oakley Furney, Chief, Bureau of Industrial and Technical Education, State Education Department, Albany, N. Y.; Morris E. Siegel, Director of Vocational High Schools of the city of New York; and Mortimer C. Ritter, Director, Central High School of Needle Trades, New York City.

The book is very complete and it has been brought up to date so as to include the newer synthetic fibers and filaments.

Practical Aircraft Sheet-Metal Work

By R. H. Frazer and Orrin Berthiaume. Cloth, spiral binding, 193 pages plus 48 full-size blueprints, 8½ by 11 in. Price, $3.00. Published by The McGraw-Hill Book Co., New York, N. Y.

This book was written by men who have had experiences both as mechanics and as teachers. The material is divided into 4 units, the first of which takes up assembly work. Unit 2 is devoted to related information; No. 3 is on developing of templates and on the principles of blueprint reading; and No. 4 contains exercises in blueprint reading. Four full-size blueprints come with the book.

Breaking the Skilled Labor Bottleneck

By Eugene J. Benge. Cloth, 47 pages, 8⅛ by 10¾ in., illustrated. Price, $2. Published by the National Foremen's Institute, Inc., Deep River, Conn.

This book on how to utilize present labor resources by specialized training and by subdividing labor skills to keep up maximum production, has been written by a man well versed in management affairs.

It is specially intended for instructors of war-production training classes, shop foremen, supervisors, and job setters.

Let's Write Good Letter

By Sherman Perry. Cloth, 176 pages, 5½ by 8¾ in. Price, $1. Published by The American Rolling Mill Co., Middletown, Ohio.

Written by an executive to help his co-workers who must write business letters, this book contains a great many important suggestions for all letter writers.

Besides emphasizing the rules of English and grammar, there are many bits of sage advice which are equally valuable to the one who dictates and the one who takes the dictation.

Shop teachers will find this book valuable.

Reading Engineering Drawings

By George F. Bush. Cloth, spiral binding, 60 pages, 8½ by 11 in., illustrated. Published by John Wiley and Sons, New York, N. Y.

A brief treatise on the art of reading shop

(Continued on page 36A)

Filing Hints to meet war-time needs

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MACHINISTS' FILES

FOR GENERAL MACHINE shop work, Machinists' Files are of three degrees of coarseness or tooth spacing: (1) Bastard which is the coarsest (2) Second Cut which is medium, and (3) Smooth which is the finest. Bastard Cut Files are for removing metal rapidly; Second Cut and Smooth Files for levelling off or finishing, and for use on all soft or tempered metals. All Machinists' Files are Double-Cut and include the following shapes:

SHAPE	CROSS SECTION	WIDTH OR FACE		THICKNESS OR EDGE		GENERAL USES
		from heel to middle	from middle to point	from heel to middle	from middle to point	
Flat		Uniform	Tapered	Uniform	Tapered	A general-purpose file. Good for flat surfaces.
Hand		Uniform	Uniform	Uniform	Tapered	Another general-purpose file for angles, corners, and flat surfaces.
Pillar		Uniform	Uniform	Uniform	Tapered	Keyways, slots and narrow work.
Warding		Tapered	Tapered	Uniform	Uniform	Narrow work requiring thin file. Making keys.
Square		Uniform from heel to middle; then tapered to point				Corners, grooves, keyways, slots.
Three Square		Uniform from heel to middle; then tapered to point				Acute angles, corners, grooves, notches.
Round		Uniform from heel to middle; then tapered to point				Holes, shaping curved surfaces.
Half Round		Uniform from heel to middle; then tapered to point				Concave corners, crevices, rounding holes.
Knife		Uniform from heel to middle; then tapered to point				Cleaning out acute angles, corners, slots.

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As National School Distributors for scores of leading manufacturers, we can offer an unduplicated service on defense training equipment, supplies, and material. Over 6,000 items, including the famous B-G Soft Textured, Kiln-Dried Lumber — used by schools from coast to coast.

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Communicate with us now about your needs and problems. We're helping and serving schools every day in the week — even to the planning of complete school shops. Tell us *your* requirements — if necessary, we'll gladly send a representative to confer.

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Shop Equipment News

New Products — Publications

THE KEMPSMITH TYPE G MILLERS

The new Type G milling machine recently produced by the Kempsmith Machine Co., Milwaukee, Wis., is fully described in an eight-page pamphlet published by the firm.

It has been developed for precision performance, has a centralized control, 18 speeds and feeds, with all spindle assemblies mounted on ball bearings.

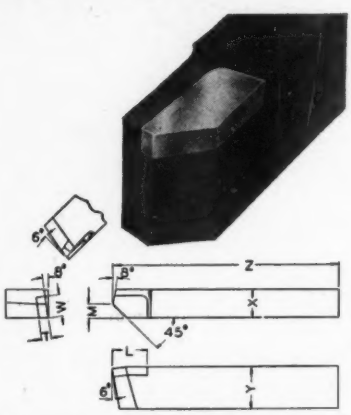
Liberal lubrication is assured by an automatic splash system, and special construction insures strength, rigidity, and accuracy. The steel overarm is 4 in. in diameter, with a distance of 6¾ in. to the center of the arbor.

Among the attachments that are available for this miller are the vertical attachment, a universal attachment, slotting attachment, circular milling attachment, universal dividing head, and various types of vises.

For brief reference use IAVE—1210.

CARBIDE TOOL WITH LEAD ANGLE

The McKenna Metals Co., 305 Lloyd Ave., Latrobe, Pa., has developed a steel-cutting carbide tool having a lead angle. These new tools, styles 39 and 40, combine the lead angle or side cutting edge angle with a tip which is longer than customary on carbide tools having a lead angle. Style 39, as shown, and the opposite hand style 40, not shown, will be considered as standard tools in the Kennametal line.



These tools are particularly economical in shell turning operations because only the edge on the lead angle is sharpened and it is easy to maintain the control position of the nose as the tool is reground.

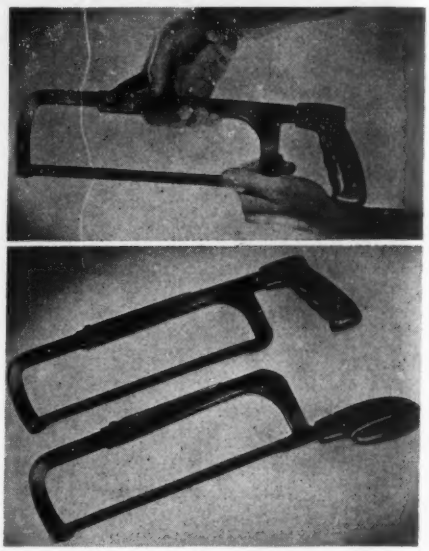
These tools are used widely in shell turning where uniform forgings do not require the depth of cut to exceed the length of the tip having a lead angle. The chip breaker is ground only on the section parallel to this lead angle. These tools are available in sizes of ⅛ by 5/16 by ⅝ in. to ⅛ by ¾ by 1½ in. They may also be used for chamfering operations.

For brief reference use IAVE—1211.

LEVER-LOCK HACK-SAW FRAME

A cam-action lever-lock sets up and releases the blade in a new type of hack-saw frame manufactured by Clemson Bros., Inc., of Middletown, N. Y., makers of Star Hack Saw Blades. Loose blade studs and threaded tension devices have been completely eliminated with the result that blades can be quickly replaced or repositioned.

Straighter cuts and a reduced blade breakage result from the extremely high tension which this new Star Frame puts on the blade. This high tension is possible because the frame is made of heat-treated spring steel. A gun metal finish insures resistance to rust and all other forms of corrosion.



Above, replacing the blade
Below, the new frame is available with either straight or pistol grip

The frame may be adjusted for 8-, 10,- or 12-in. blades by pulling out a single pivot pin to its open position, sliding frame forearm in or out to desired length, and snapping pin back into place. Blade may be repositioned to face in any of four directions by placing it over either of two sets of fixed pins which are integral with frame.

The frames may be had with either straight or pistol grips.

For brief reference use IAVE—1212.

NEW MOUNTED WHEEL MANUAL

A 64-page booklet, describing the numerous types of mounted abrasive wheels which find so many applications in the present war-production program, has been produced.

The book contains tabulated lists giving all the needed information for making the proper selection for particular grinding jobs.

The Handee, Hi-Power grinders, and drum sanders and belts also are described, as well as the accessories which have been made available for them.

For a copy of this manual address Chicago Wheel and Mfg. Co., 1101 West Monroe St., Chicago, Ill.

For brief reference use IAVE—1213.

PRECISION AND TURRET-LATHE CATALOGS

Catalog No. 13 containing full information on South Bend 13-in. precision lathes, has been recently issued by the South Bend Lathe Works. This 8-page, file size catalog illustrates and describes the 13-in. toolroom lathes and engine lathes developed by this firm. Attachments, accessories, and tools for use with the lathes are also listed.

These lathes have a 13⅜-in. swing over the bed and saddle wings, 11/16-in. collet capacity, 1-in. spindle bore, and are made in several bed lengths that provide 16 to 52-in. between-centers capac-

(Continued on page 32A)

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When you specify Millers Falls tools on your priority orders, you gain two ways:

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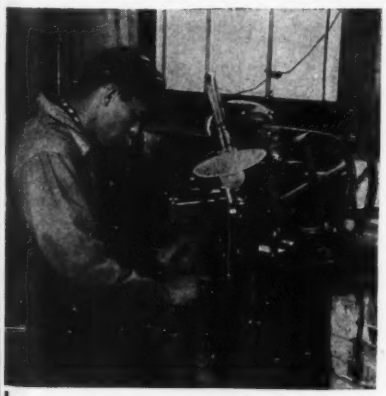

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Chicago (Ill.) Public Schools
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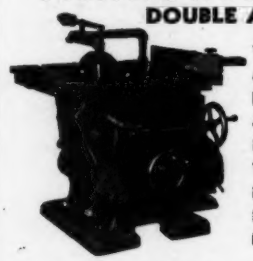

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Catalog IA sent to teachers of Industrial Arts who specify school connection.

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SHOP EQUIPMENT NEWS

(Continued from page 30A)

ities. The eight spindle speeds provide a range from 34 to 875 r.p.m. A full-page of tabulated specifications gives essential information on capacities, feeds, speeds, and dimensions.

Catalog No. 67–W describes and illustrates the South Bend 2–H turret lathes and the numerous attachments and accessories which are available for adapting them to various types of production work. Tabulated specifications give full information on capacities, speeds, feeds, and dimensions. These lathes have a swing over the bed and saddle wings of 16 in., 1-in. collet capacity, and 1⅜-in. spindle bore.

Catalogs may be obtained by writing to South Bend Lathe Works, South Bend, Ind.

For brief reference use IAVE—1214.

K-D VALVE SERVICE BULLETIN NO. 542

First published in 1937, the K–D Valve Service Bulletin on Mercury, Lincoln-Zephyr and all Ford motors has been revised and brought up to date.

This small 16-page manual is prepared especially for shopmen. It is printed on tough Kraft paper to stand hard shop use and is profusely illustrated to make reading quick and easy.

Short cuts in service procedure are described and data on clearances, tolerances, and adjustments is given.

The published price is 25 cents per copy but teachers may secure a copy free by writing K–D Manufacturing Co., Lancaster, Pa., and asking for a copy of the No. 542 Valve Service Bulletin.

For brief reference use IAVE—1215.

POWER TOOLS AND ATTACHMENT CATALOG

The Jefferson Machine Tool Co., Fourth, Cutter, and Sweeney Sts., Cincinnati, Ohio, are announcing new, 6-in. plain and tilting dividing heads for use with their Bulldog precision milling machines.

Both of these heads have an actual swing of 6 in. The spindle on both have No. 7 B.S. taper, and take-up collars for end thrust. The threaded spindle nose is 1⅛ in. in diameter with 12 threads per in., for chucks or work fixtures.

The plain dividing head has an over-all length of 6¾ in., and a 3¼ by 3-in. base. It is equipped with three 4-in. dividing plates which cover the entire range of the B. & S. index charts; and one 4½-in. 24-notch, rapid index plate.

The tilting-dividing head tilts 5 deg. below horizontal and 5 deg. past the perpendicular. The swivel is graduated up to 100 deg. The worm-wheel radio is 40:1, and the head is equipped with three indexing plates which divide all numbers up to 50, and all even numbers (except 96) to 100.

This firm also manufactures a swivel vise with hardened jaws 1⅛ in. deep, 3¼ in. wide, capable of a maximum opening of 2 in. It is graduated so that it may be swiveled through a range of 360 deg.

For brief reference use IAVE—1216.

WET-DRY BELT SURFACING

The twenty-four page booklet, entitled Wet-Dry Belt Surfacing, explains how this method of using abrasive belts may be used in many ways and on many types of materials in cutting down the method of giving the final finishing touches in less time than would be required if the work were performed on other production machines.

The advantages of this type of surfacing may be summarized as follows:

It is versatile, relieves and supplements heavier power machinery, eliminates handling, prevents heating (especially when wet-belt surfacing is used), eliminates hand filing, reduces the dust problem, produces uniformly flat surfaces, reduces the setup time, and may be operated by semiskilled operators.

A copy of this book may be obtained from the Porter-Cable Machine Co., Syracuse, N. Y.

For brief reference use IAVE—1217.

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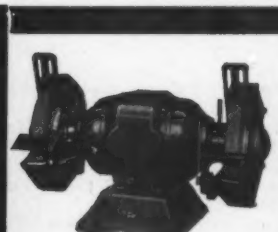

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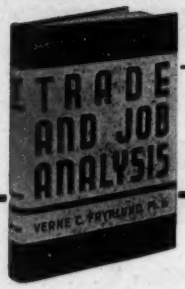

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Verne C. Fryklund, Ph.D.

Formerly Associate Professor, Industrial Education, University of Minnesota, College of Education, Minneapolis, Minnesota

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(Continued from page 29A)

drawings with special emphasis on the drawings found in the machine shop, the structural shop, and the airplane factory. Riveting, welding, piping, and electrical symbols are shown and their uses explained.

National Defense Training-Machine Tool Operators

Prepared by The Washburne Curriculum Bureau, Chicago Public Schools, Chicago, Ill. Paper, spiral binding, 90 pages, 8½ by 11 in., illustrated.

An instructor's manual containing a goodly number of good jobs for the machine shop, together with some helpful instruction sequence and progress charts.

How To Make Your Own Furniture

By Eugene O'Hare. Cloth, 8½ by 11 in., illustrated. Price, $2.50. Published by Harper & Brothers, New York City.

This book describes in simple terms how the beginner can build nine pieces of sturdy furniture of modern design with a tool equipment embracing but 17 tools.

Each article is illustrated and the method of procedure is given step-by-step, so that the beginner can follow readily.

The use of modern materials, such as linoleum, sheet-cork veneers, plywood, and casein paints are also described.

General Shop Electricity

By A. W. Dragoo and Kenneth L. Dragoo. Paper, 7¾ by 10⅝ in., 124 pages, illustrated. Price, 80 cents. Published by McKnight & McKnight, Bloomington, Ill.

The contents of this book are divided into five units in each of which the fundamental operations and the general information about specific phases of the subject of electricity are presented.

The first unit is devoted to simple wiring circuits. Unit Two treats of battery connections and testing. Unit Three describes low-voltage lighting and high-voltage current. High voltage and house lighting is the subject of Unit Four, and Unit Five is devoted to wiring with nonmetallic cable.

A number of interesting electrical projects also are included.

MISCELLANEOUS BOOKS AND PAMPHLETS

Among the books and pamphlets received which may be of interest to shop teachers are the following:

American Timbers of the Mahogany Family

By Samuel J. Record. Published by Mahogany Association, Inc., 75 East Wacker Drive, Chicago, Ill.

Year Book

By the Council of Parent-Teacher Associations of the Minneapolis Public Schools, Minneapolis, Minn.

Welding Procedures

This book can be obtained from Air Reduction Sales Co., Lincoln Building, 42nd St., New York, N. Y. Price, 60 cents.

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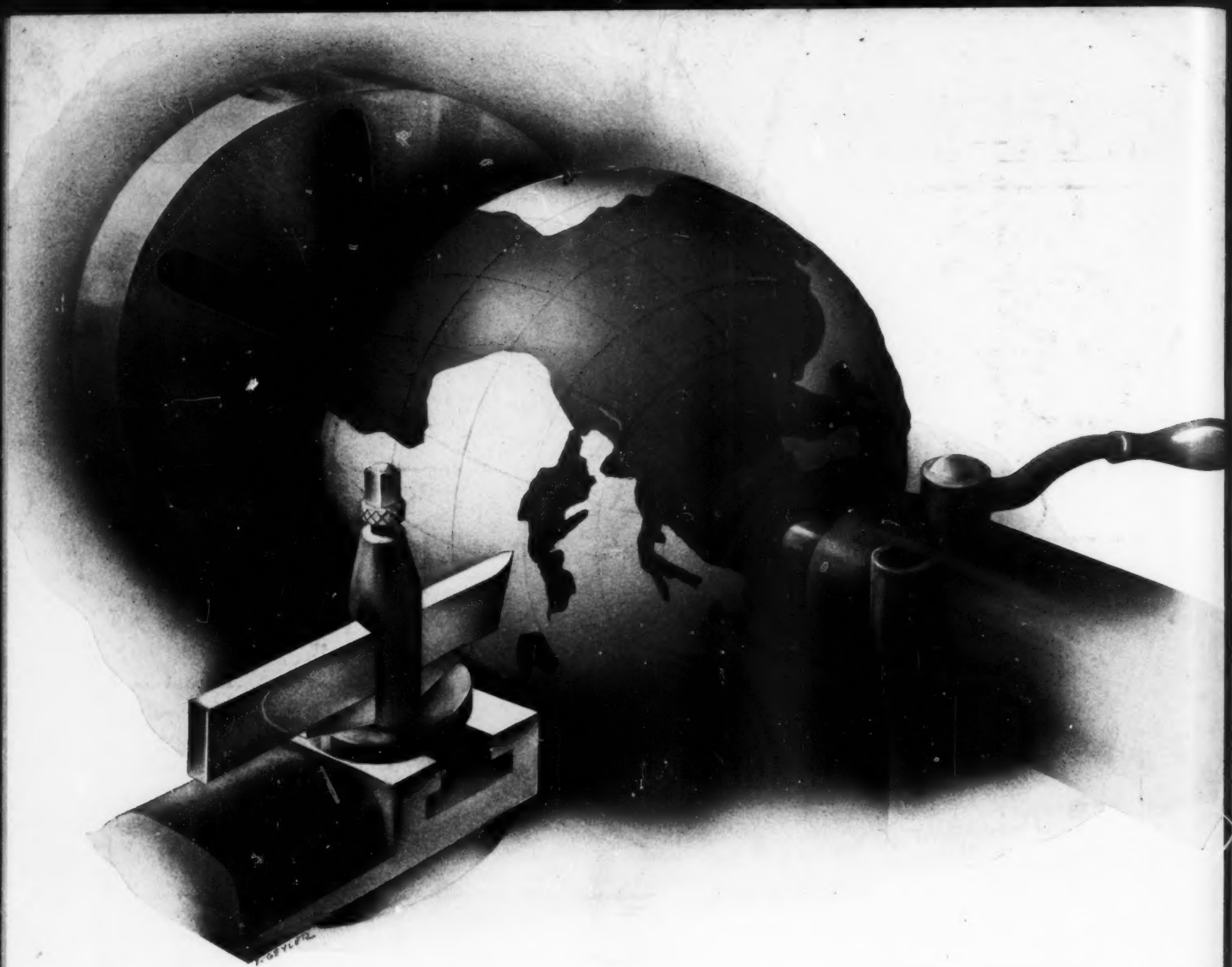

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